THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LV. No. 1407.] LONDON, APRIL 29, 1890. [42ND YEAR. Price 6d.

WOLSTON'S Paste and Ready Mixed for Use. Guaranteed Free from Adulteration. **TORBAY PAINTS.**

FOR GASHOLDERS, &c., &c.

The Original "Torbay Paints"

As supplied during many years to the LONDON GASLIGHT & COKE COMPANY.

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TORBAY & DART PAINT Co., Ld.,
23, Gt. George St., Westminster, S.W.
DARTMOUTH, & BRIXHAM (TORBAY).

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PARKER & LESTER,
Manufacturers & Contractors.

THE ONLY MAKERS OF
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores for Gas and Water Works.

WORKS:
ORMSIDE STREET, OLD KENT ROAD, LONDON.

Ashmore, Benson, Pease, & Co., Ld.,
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Manufacturing Gas Engineers.
See Advertisement, p. 810.

CEMENT
EARLE'S
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Portland Cement
MANUFACTURED BY
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Office: 7, PIER STREET.
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STOREAGE CAPACITY 10,000 Tons.

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We specially solicit Government and Local Board Contracts for General Lighting.

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MELDRUM'S PATENT FURNACES

RAISE STEAM BY BURNING

BREEZE, COAL DUST,

AND OTHER SMALL AND POOR FUEL.

Telegrams: "Meldrum Manchester."

REALIZED SAVING UP TO

Results Guaranteed.

£200

PER BOILER PER ANNUM.

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(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER & BOILER WORKS,

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MANUFACTURER OF TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,

Wrought-Iron Roofs, Bridges, Girders, &c.,

Steam, Hot Water, and Range Boilers, Tanks, Cisterns, Boats, and all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES SUPPLIED ON APPLICATION.

TELEGRAPHIC ADDRESS: "COCKEY'S FROME."

EDWARD COCKEY & SONS, Ld.,

ESTABLISHED OVER HALF A CENTURY.

Gas Engineers and Contractors for the Erection of Gas-Works.

MANUFACTURERS OF IMPROVED GAS-EXHAUSTING APPARATUS.

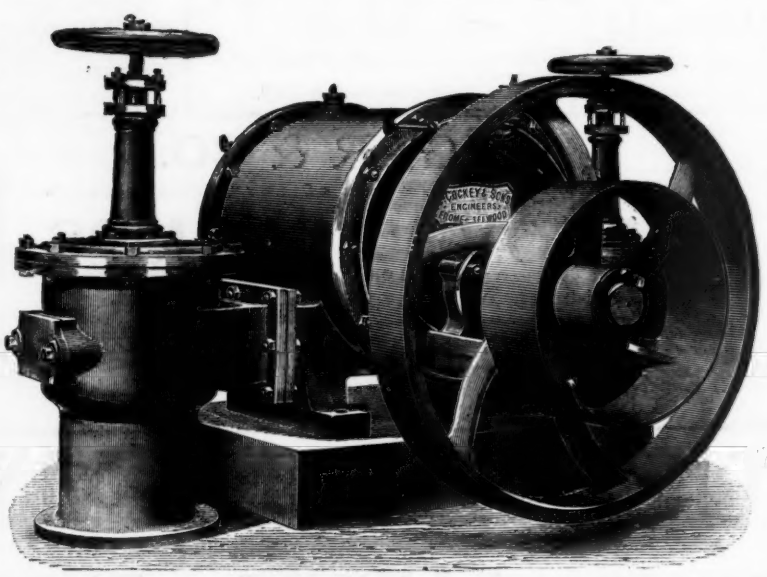
A Large Stock of Valves always on hand.

Lamp Columns; various patterns.

Wood Grids for Purifiers and Scrubbers.

Castings of every description.

Apparatus for the manufacture of Sulphate of Ammonia.



Experienced Retort-Setters constantly employed.

Lead Burning and Plumbing in all its Branches.

Gas-Fittings in great variety.

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Boilers and Engines.

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HIGHEST AWARDS—LONDON, PARIS, COLOGNE, VIENNA, MELBOURNE, AND OTHERS.

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MANUFACTURERS OF TUBES AND FITTINGS OF EVERY DESCRIPTION.

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THOMAS PIGGOTT & CO.,

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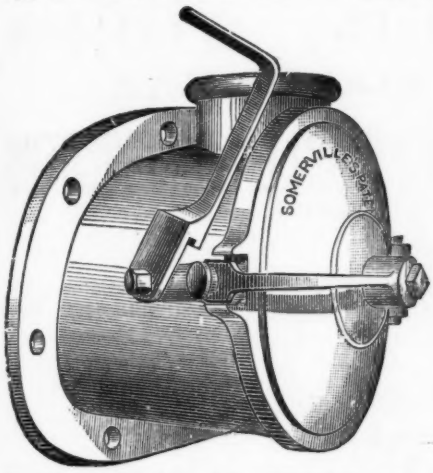

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RETORTS AND FITTINGS, PURIFIERS, VALVES, PIPING, SCRUBBERS, CONDENSERS, WASHERS, &c., &c., &c.;

GASHOLDER TANKS IN CAST AND WROUGHT IRON;

GOLIATH, HYDRAULIC, AND OTHER PURIFIER COVER LIFTS,

ALL OF THE MOST APPROVED DESIGNS.

BOILERS, ENGINES, PUMPS, EXHAUSTERS, METERS, GOVERNORS, &c.

SULPHATE OF AMMONIA PLANT.

MAKERS OF

SOMERVILLE'S PATENT RETORT MOUTHPIECES & LIDS,

WHICH ARE SELF-SEALING AND REQUIRE NO LUTING.

Prices and further Particulars may be obtained on application.

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GAS TUBES

MANUFACTURERS OF EVERY DESCRIPTION OF

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FOR ANY PURPOSE.

NEWTON, CHAMBERS, & CO., LIMITED,

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MANUFACTURERS OF

SLIDE VALVES,
WITH RACK & PINION,
OR
Internal or External
SCREWS, of all Sizes.
GASHOLDERS,
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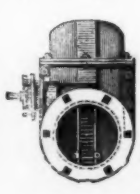

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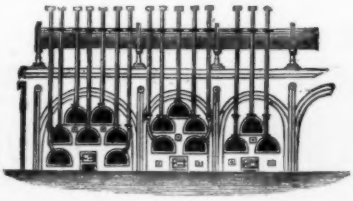
Iron Roofs, Columns, Girders, Floor Plates and Tools, &c.



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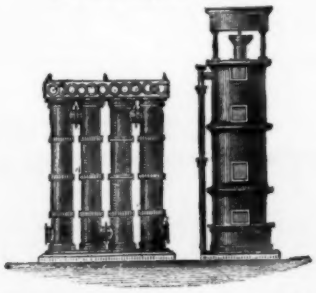

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CENTRE VALVES
for working Purifiers.
Also Bye-Pass Stop Valves.

PURIFIERS with Planed Joints,
HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS and SPECIALS.
WOOD GRIDS.
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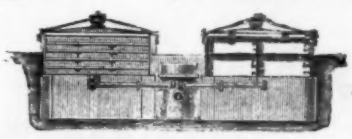


DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

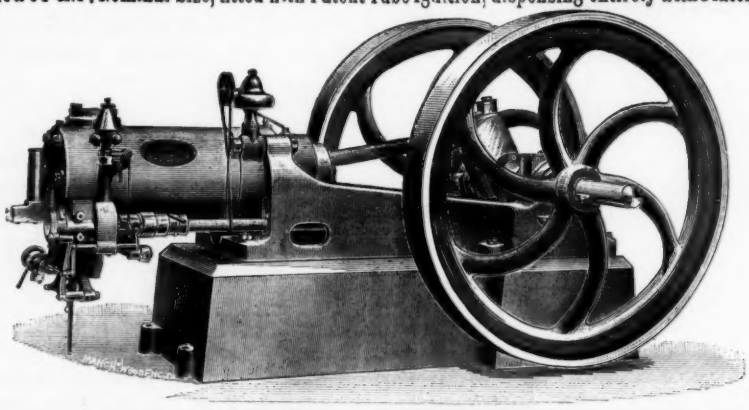
Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

CROSSLEY'S "OTTO" GAS-ENGINE.

100 Prize Medals.

New 14-H.P. Nominal Size, fitted with Patent Tube Ignition, dispensing entirely with Plates.



MADE in SIZES *2-Man to 100-HP.*

GAS-ENGINES COMBINED WITH **PUMPS** FOR TOWNS SUPPLY, SEWAGE, &c., &c.

GAS-ENGINES COMBINED WITH **AIR COMPRESSORS** FOR THE SHONE SEWAGE SYSTEM, LUCIGEN LIGHT, &c.

MADE in SIZES *2-Man to 100-HP.*

VERTICAL AND HORIZONTAL TYPES.

ENGINES *COMBINED* WITH HOISTS, PUMPS, DYNAMOS, &c. &c.

Largely used for EXHAUSTING, PUMPING, COKE CRUSHING, ELECTRIC LIGHTING, &c., &c.

Over 31,000 "OTTO" ENGINES are at work.

CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER,

LONDON, LIVERPOOL, GLASGOW, NEWCASTLE, BIRMINGHAM, HULL.

HARRIS & PEARSON,

STOURBRIDGE, ENGLAND.

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

GLAZED BRICKS AND PORCELAIN BATHS.

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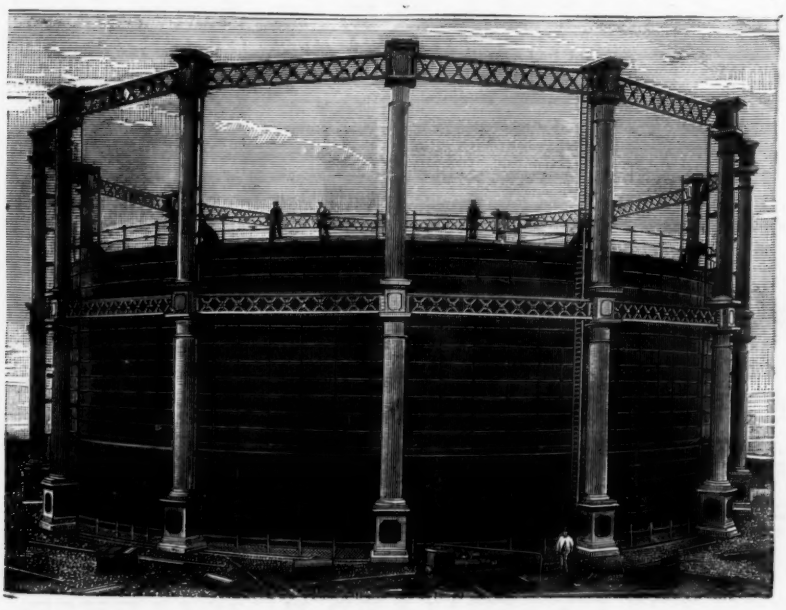
Engineers, Ironfounders, and Contractors,

GAS PLANT WORKS, NEWTON HEATH, MANCHESTER,

MANUFACTURERS AND BUILDERS OF

GASHOLDERS

In SINGLE, DOUBLE, TREBLE, or QUADRUPLE LIFTS,



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COLUMNS or STANDARDS

Single-Lift Holders

Converted into

TELESCOPES.

GASHOLDER TANKS IN Steel or Wrought Iron.

CAST-IRON Gasholder Tanks WITH PLANED JOINTS.

JOHN HALL & CO.,

STOURBRIDGE,

MANUFACTURERS OF FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

A STOCK OF DIFFERENT SHAPES ON HAND.

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CASTINGS OF EVERY DESCRIPTION.

MANUFACTURED BY THE

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SULPHATE OF AMMONIA.

By Her Majesty's Royal Letters Patent.

DR. FELDMANN'S APPARATUS

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICES APPLY TO THE

Sole Agents and Manufacturers,

GODDARD, MASSEY, & WARNER,

ENGINEERS,

NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

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And to the following Gas Companies and Corporations:—

ILKESTON.
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HALIFAX.
ALTRINCHAM.
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CUTLER'S PATENT
SPIRAL GUIDE-FRAMING
FOR GASHOLDERS.

STRONG. SAFE. CHEAP.

MOST ADVANTAGEOUS DISPOSITION OF MATERIAL.

Economical both in Manufacture and Erection; and by avoiding the necessity for large Piers, permitting considerable Economy in the Construction of the Tank.

FULL PARTICULARS FROM THE PATENTEES,

MESSRS. S. CUTLER & SONS, ENGINEERS,

GREAT GEORGE STREET CHAMBERS,

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WORKS: MILLWALL, LONDON, E.

JOSEPH CLIFF & SONS,

INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,

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MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

ESTABLISHED MORE THAN A QUARTER OF A CENTURY

WORKS
HUNSLET,
LEEDS

LONDON OFFICE:
60, QUEEN VICTORIA STREET
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CLAYTON SON & CO. LTD.

MAKE A

SPECIALTY

OF

GASHOLDERS

AND
MAKERS
OF

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"GAS LEEDS"

GAS PLANT OF EVERY DESCRIPTION.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND DISTRICT OFFICE: 22, TEMPLE STREET, BIRMINGHAM—AGENT: A. C. SCRIVENER.

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R. DEMPSTER & SONS, Ltd.,

ROSE MOUNT GAS ENGINEERING WORKS,

ESTABLISHED — **ELLAND.** — 1855.

A

Coke-Breaking Machine

Of this type has been made for

Messrs. BRUNNER, MOND, & Co., LTD.,

CHEMICAL MANUFACTURERS,

NORTHWICH,

And has given GREAT SATISFACTION.

Ours is a Strong, Reliable Machine, and WE GUARANTEE it to be THOROUGHLY EFFECTIVE and SATISFACTORY in every respect.

The above illustrates our ***IMPROVED COKE-BREAKING MACHINE,*** *which is capable of breaking upwards of 40 Tons of Hard Coke per day, with a minimum make of Breeze. It is adapted for Breaking the Coke to any required size.*

For Prices and further Particulars, apply to **DEMPSTERS', ELLAND.**

KIRKHAM, HULETT, & CHANDLER, Ld.,

PALACE CHAMBERS,

9, BRIDGE ST., WESTMINSTER.

Mr. S. HERSEY, Managing-Director. Mr. J. CHANDLER, Engineer.

THE "NEW" PATENT

"Standard" Washer-Scrubber,

As supplied to and in course of construction for numerous Gas-Works. (*See previous Advertisements.*)

Thoroughly extracts every grain of Ammonia and a large quantity of other Impurities from Gas.

Has been for many months in successful and satisfactory operation at **The Gaslight and Coke Company's Station at BECKTON** (*vide* Testimonial).

The Gaslight and Coke Company, Horseferry Road, Westminster, S.W.,

Nov. 25, 1889.

Messrs. Kirkham, Hulett, and Chandler, Ltd.,

Gentlemen,—In reply to your enquiry respecting the result of putting Wooden "Bundles" into some of the Washer-Scrubbers at our Beckton Station, I beg to say that they have answered admirably for the few months they have been in; and I think them a decided success.—I am, yours truly,

(Signed) G. C. Trewby.

385 "STANDARD" WASHER-SCRUBBERS, equal to a daily capacity of 337,600,000 cubic feet of Gas, supplied and in course of construction.

The following List comprises Orders received for new "Standard" Washer-Scrubbers fitted with the improved "Wooden Bundles;" and Machines supplied in past years renewed by substituting the same in place of the "Iron Bundles":—

New Washer-Scrubbers.	Capacity in cub. ft. per 24 hours.
LIVERPOOL	3,000,000
LEICESTER	2,250,000
WEST HAM	3,000,000
MELBOURNE	1,500,000
VALPARAISO	600,000
BARRY and CADOXTON	500,000
WORKINGTON	500,000
CHARLOTTENBURG	1,500,000
MAGDEBURG	750,000
ERFURT	400,000
RAWMARSH	200,000
Renewals.	
THE GASLIGHT AND COKE COMPANY—	
BECKTON STATION	1,250,000
" "	2,500,000
NINE ELMS " (in part)	3,000,000
SHOREDITCH " "	2,500,000
PIMLICO " "	2,000,000
SOUTH METROPOLITAN GAS COMPANY—	
VAUXHALL STATION (in part)	3,000,000
BIRMINGHAM "	5,000,000
KINGSTON-ON-HULL	400,000
MELBOURNE	1,500,000
"	1,500,000
CROYDON	1,500,000
MAIDSTONE	1,000,000

385 "STANDARD" WASHER-SCRUBBERS, equal to a daily capacity of 337,600,000 cubic feet of Gas, supplied and in course of construction.

ADDRESS AS ABOVE.

R. LAIDLAW & SON.

IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES.

Two Gold Medals, One Silver Medal, One Bronze Medal, and Two Honourable Mentions,

INTERNATIONAL EXHIBITION, EDINBURGH, 1886.

A LARGE STOCK OF GAS AND WATER METERS ALWAYS READY FOR IMMEDIATE DELIVERY OR SHIPMENT.

STATION METERS,

WITH ROUND OR SQUARE CASES.

PRESSURE REGISTERS.

Improved Station and Exhauster Governors.

Lamp Pillars,
WITH EITHER WET OR DRY METERS FOR AVERAGE METER SYSTEM.

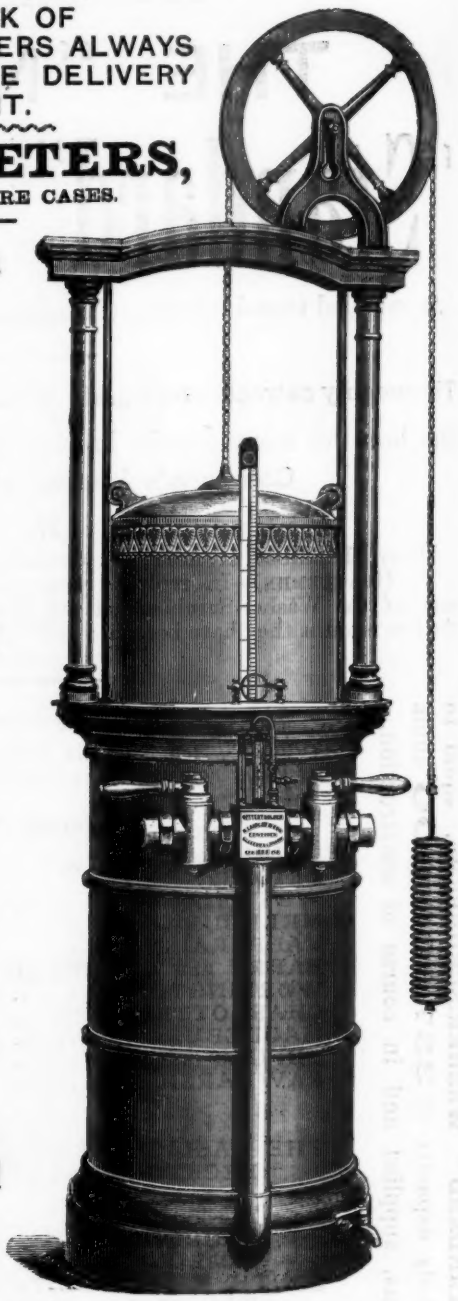
Experimental Hourly-Rate and Test Meters.

Experimental Apparatus.

Pressure Gauges.

Condenser Thermometers.

Siemens' Patent Water Meters, and Gas Apparatus and Fittings.



TEST-HOLDER.

STANDARD TEST-HOLDERS AND TEST-METERS FOR OFFICIAL INSPECTORS, &c.,

AUTHORIZED BY THE BOARD OF TRADE STANDARDS DEPARTMENT.

ALLIANCE FOUNDRY, **GLASGOW.** | SIMON SQUARE WORKS, **EDINBURGH.** | 6, LITTLE BUSH LANE, **LONDON, E.C.**

TANGYES LIMITED

CORNWALL WORKS, BIRMINGHAM.

LONDON: 35, Queen Victoria Street, E.C.
NEWCASTLE: St. Nicholas Buildings.
MANCHESTER: Deansgate.
GLASGOW: Argyle Street.
PARIS: Place de la Republique.
SYDNEY: 119, Bathurst Street.
MELBOURNE: Collins Street West.

SOLE MAKERS OF THE

"SPECIAL" STEAM PUMP

FOR PUMPING

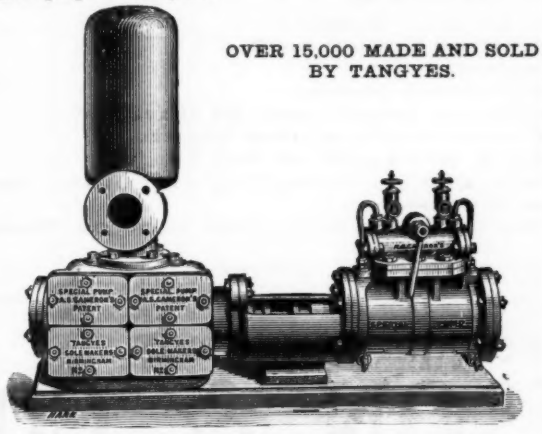
AMMONIACAL LIQUOR, TAR, & WATER IN GAS-WORKS.

Used in the Principal Gas-Works in the United Kingdom.

REDUCED PRICES.

The "Special" Double-Acting Steam-Pump is now made in some 250 sizes, and of many different designs, to suit particular requirements.
In ordering, state the purpose for which the Pump is required, to ensure suitable pump valves being sent.

OVER 15,000 MADE AND SOLD BY TANGYES.



In case of Special Quotations, the following particulars are required:—
Pressure of steam at cylinder.
Number of gallons to be raised in a given time.
The height of lift from level of water to point of delivery.
The nature of the fluid to be pumped.

The "Special" Steam-Pump can be worked by Compressed Air. For pumping Tar or Ammoniacal Liquor, the "Special" Steam-Pump is made with extra long distance piece, for which an additional charge is made.
The quantities of Tar delivered should be taken as about two-thirds those of water given below.

SIZES SUITABLE FOR GAS-WORKS.

Diam. Steam Cyl.	ins.	3	3	4	4	4	5	5	5	5
Diam. Water Cyl.	"	1½	2½	2	3	4	2½	3	4	5
Length Stroke	"	9	9	9	9	9	12	12	12	12
Gals. per hour, approx.		450	1800	800	1800	3200	1250	1800	3200	5000
Diameter Suction and Delivery	ins.	1	2½	1½	2½	2½	2	2½	3	3½
Price	£	9	12	11	13	15	15	16	19	22

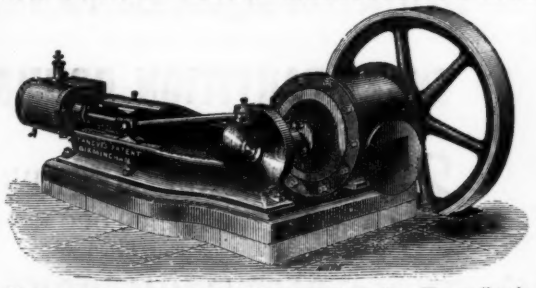
Diam. Steam Cyl.	ins	6	6	6	6	7	7	7	7	7
Diam. Water Cyl.	"	3	4	5	6	3	4	5	6	7
Length Stroke	"	12	12	12	12	12	12	12	12	12
Gals. per hour, approx.		1800	3200	5000	7200	1800	3200	5000	7200	9800
Diameter Suction and Delivery	ins.	2½	3	3½	4	2½	3	3½	4	5
Price	£	17	20	23	26	19	22	25	28	34

Diam. Steam Cyl.	ins.	8	8	8	8	8	9	9	9	9
Diam. Water Cyl.	"	4	5	6	7	8	5	6	7	8
Length Stroke	"	12	12	12	12	18	12	12	12	18
Gals. per hour, approx.		3200	5000	7200	9800	12800	5000	7200	9800	12800
Diameter Suction and Delivery	ins.	3	3½	4	5	6	3½	4	5	6
Price	£	24	27	31	36	43	29	34	39	46

Diam. Steam Cyl.	ins.	9	10	10	10	0	10	10
Diam. Water Cyl.	"	9	5	6	7	8	9	10
Length Stroke	"	24	12	12	12	18	24	24
Gals. per hour, approx.		16200	5000	7200	9800	12800	16200	20000
Diameter Suction and Delivery	ins.	7	3½	4	5	6	7	8
Price	£	56	32	37	42	50	60	67

TANGYES' IMPROVED

ROTARY GAS-EXHAUSTER.



These Exhausters are supplied with or without Engine. The smaller sizes (Nos. 1 to 6), when supplied with Engine, are mounted on strong cast-iron base plate—as illustrated—which also carries the Engine.

No.	Cubic Feet per Hour.	Inlets and Outlets.	Horse power of Engine.	PRICE.
1	2,000	3 inches.	2	£60
2	3,000	4 "	2	65
3	5,000	5 "	2	75
4	7,500	6 "	2	80
5	10,000	7 "	3	95
6	15,000	8 "	3	115
7	20,000	9 "	4	125
8	30,000	10 "	6	175
9	40,000	12 "	8	210
10	50,000	14 "	10	260

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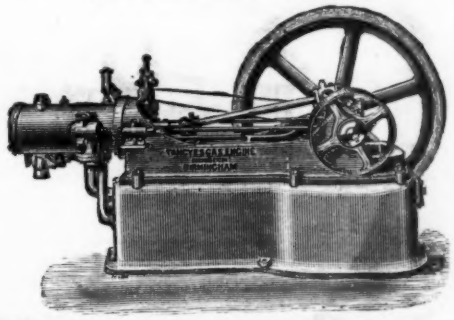

The ½, 2½, and 4 horse power sizes are of the type shown in illustration. The 1-horse power size is of the type of the "Tangye" Steam-Engine.

Working size	½ H.P.	1 H.P.	2½ H.P.	4 H.P.
Test Horse Power	1	1·4	3	6
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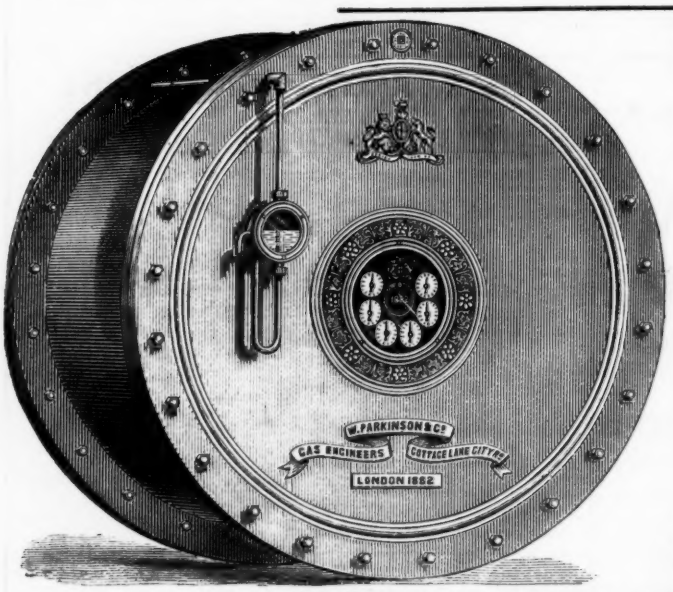

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, APRIL 29, 1890.

Profit Sharing in Parliament.

IT is a sign of the times that the House of Commons should have given a night last week to the discussion of the present relations between labour and capital in this country, on a motion by Mr. Bartley for an inquiry by a Committee of the House into the various plans of profit sharing at present in vogue. It was a very interesting and important discussion, and led to a highly satisfactory result; for the President of the Board of Trade volunteered to set the machinery of his Department in motion to collect information on the subject, with a view to presenting it to Parliament and the country in a readable shape. This is as much as can be asked for just now; because, although the idea is undoubtedly in men's minds, it requires a great deal more definition than can be given to it for the present. The honourable member for North Islington is to be congratulated on his "bloodless victory" in getting all he wanted without the fuss of a division, which might have resulted in some members committing themselves to a definite course in a matter regarding which their minds cannot fairly be supposed to be made up. In the course of his speech, Mr. Bartley referred to the South Metropolitan gas stokers' strike, and shrewdly enough remarked that the reason for the opposition of Trades Unions to schemes of the kind, was the fear lest their influence should be destroyed thereby. Mr. Burt, however, who may be credited with some authority on this point, afterwards corrected Mr. Bartley, and claimed that Trades Unions generally had never been hostile to profit sharing. This is a matter that requires to be cleared up. Our own impression is that a Trade Union executive that would welcome a radical improvement in the condition of its members not brought about by its agency; and likely to reduce its importance, would be hard to find. There may be such; but we have not met with any specimen of the kind. Speaking in the course of the debate, Sir J. Colomb elicited cheers by denouncing the "amateur conciliator, "who often stepped in to meddle with things he did "not understand in order to reap political capital or "popularity."

The great feature of the debate, however, was the terrific attack of Mr. Bradlaugh on Mr. Cunninghame Graham. To say that the junior member for Northampton rent the amateur labour agitator and representative of North-West Lanarkshire limb from limb, and scattered his (oratorical) remains over the floor of the House, would be a feeble description of the affray that delighted the faithful Commons, ever happy in the prospect of a controversial dog-fight. It could, indeed, hardly be called a fight, for the unfortunate Mr. Graham could do no more than twist and yelp in the grip of his tormentor, who shook him as a terrier does a rat, and finally flung him aside limp and gasping. John Burns and Tom Mann suffered equally from Mr. Bradlaugh's ruthless handling. It is not pleasant to be described, in words certain to be read throughout the length and breadth of the land, as having interfered in labour disputes which one does not understand, and "led poor and hungry men "to waste money they had saved for good and useful "purposes in maintaining a hopeless struggle." It is also irritating to the unsuccessful agitator to be reminded of the existence of "more than one class of men in this country "who had been trying to organize, and some who, misled "by phrases, had suffered by not following the advice of "those to whom they formerly looked for guidance." This and much more did Mr. Bradlaugh say; and Mr. Graham could only reply by futile interruptions, which displayed the impotent wrath of a weak demagogue exhibited in all his hollowness. It is to be hoped that workmen will read this debate. As Mr. Broadhurst remarked: "Thank God the average British working man "is wiser than some of the would-be friends who advocate "his cause;" and this is well, or industry would soon cease from returning any profit to be shared. It is to be hoped, moreover, that after this exposure, the deluded men who have made of their bodies a pedestal for enabling Messrs. Graham and Co. to hoist themselves into prominence will return to reason, and leave these individuals in their natural insignificance.

The North of England Association Meeting—Mr. W. J. Warner on Mains and Services.

THE members of the North of England Gas Managers' Association met in Newcastle-upon-Tyne last Saturday, under the presidency of Mr. R. Bridge, of Doncaster, who is now succeeded by Mr. W. Hardie, jun., of Tynemouth. There was a fair attendance. Mr. W. J. Warner, of South Shields, was to have read a paper; but, while excusing himself, he did nearly as well in bringing before the Association some few "Notes" upon gas-distributing plant as though he had compiled a formal essay. The first point made by Mr. Warner was with regard to the drawing of services from mains by the passage over the

roadways of heavy rollers. This is obviously a serious evil; for an escape of gas from a hole in a main from which a ¾-inch service has been so forcibly drawn that the threads are stripped and the metal left burnished like silver, is likely to lead to grave trouble. Apart from this particular instance of damage to gas mains and services by the road-roller, Mr. Warner's statistics showed that "nearly 70 per cent. of the injuries to the distributory "plant of a gas undertaking arise from the operations of "Local Authorities." It is as well to have facts of this nature placed on record; for although Local Authorities will probably persist in carrying on their operations with regard to road-making without particular solicitude for what happens underneath the surface, it is desirable that the effect of their proceedings should be kept before them. It is facts like these that ought to be laid before Parliament in connection with such legislation as that which the London County Council are actually endeavouring to procure, as mentioned in these columns a fortnight ago. Gas Companies do not desire the monopoly of the subsoil. They never had it; for they have always been compelled, very properly, to take heed of the water-mains that run through the same streets. Now-a-days the subsoil of town thoroughfares is full of pipes, wires, and conduits of different kinds, among which the steam-rollers of the Highway Authorities make havoc. If matters are not tending in the direction of an alliance between owners of property buried under the streets for the defence of their common interest as against the improper treatment of the surface by Local Authorities or anybody else, it is at least certain that the time is approaching when, in all thickly-populated districts, measures must be taken, for the public safety, to systematize the use of the subsoil by the various undertakings authorized to occupy it for the purposes of their business. We only need a disastrous street explosion or two, which may easily be brought about by the agencies mentioned by Mr. Warner, to constitute this a burning question for Local Authorities and the public generally.

Another Example of the American Gas Puzzle.

In further illustration of the rudimentary ideas prevalent in the United States on the subject of the regulation of gas undertakings in the public interest, the case of Baltimore may be cited. It should be remembered that Baltimore has been "struck" several times by pirates of the kind alluded to in our last week's comments upon American gas finance; but at last it has occurred to some members of the Local Authority that a little of the protection supposed to be indispensable for the national industry would do no harm to the local investment in gas property. Accordingly, more than one Bill relating to this subject has been brought into the State Legislature; each in the usual fashion aiming at something omitted by, or misrepresented in, the others. What the Legislature will do with them all remains to be seen—a decision being as yet in the future; but confusion threatens to be worse confounded by the absence of anything like a principle from all the different methods of stating the case to the Legislature. The object is to increase the security of the Baltimore Gas Company, and consequently to cheapen the capital required for the supply of gas to the city; but the difficulty is to settle the *quid pro quo* in this arrangement. One would-be authority adopts the simple device of a maximum price for gas for a term of years; but this is, of course, as barbarous an ordinance as the mediæval orders settling the market values of bread and labour. It is curious how history repeats itself in these instances of the domestic policy of a nation that takes credit to itself for progress. Why, even in St. Louis, which would scorn comparison with the South for enlightenment, a law has been passed requiring the Laclede Company to sell gas for 90 c. per 1000 cubic feet. This is pure Mediævalism, neither more nor less, and proceeds on the infantile assumption that the price of a manufactured commodity may be fixed by law, while the value of labour, raw materials, and money remain variable. In Baltimore one proposal is for gas to be sold always at the price of $1·25 per 1000 cubic feet, and the Company at the same time to pay a subsidy of $10,000 a year to the city. If, moreover, the Company declare a 3 per cent. dividend on their present capital, they are to hand over a further sum of 3 per cent. on the amount of this dividend. Beyond this there is no check on the dividend payable, and, of course, nothing to connect it in any way with the price of gas. An amendment has been proposed for controlling the price of gas in Baltimore by reference to the price paid in some other large cities of the Union; but the whole thing is mere chaos—not containing one of the elements of a rational self-acting safeguard for the regulation of the interest of the public in connection with that of the Company. It is most disappointing to observe the inability of American publicists to formulate a satisfactory scheme for the protection of the capital sunk in gas supply in the States and of the gas consumers and general public. We have no desire to recommend the British sliding scale; but we wait in vain for any respectable native suggestion likely to answer the purpose. The problem is essentially an American one; and if Americans are unable to solve it, they must pay the penalty of their weakness, which is spoliation.

Gas Profits and Art Patronage.

The remarkable application made of part of the profits of their gas undertaking by the Corporation of Oldham, has at last attracted the attention of the London press. The art critic of the *St. James's Gazette* has learnt, obviously to his amazement, that the Oldham Corporation devote money thus obtained to the purchase of pictures for the local art gallery from the annual exhibition held in the town. This writer dilates with an evident sense of amusement, as from the contemplation of something ludicrously incongruous, on this Lancashire way of establishing a connection between gas and pictures; and remarks that in Oldham at least "strikes and increased wages will hit the "artist in other ways than with his gas bill." The reflection is not very apposite, unless it is to be understood that the Corporation purchases of pictures out of gas profits are restricted to the productions of artists who are also ratepayers and gas consumers of the borough. Gas profits are spent by Corporations for very many purposes; and there is no reason why, if the principle is admitted, they should not be applied to the encouragement of local art. They are very commonly spent on town improvements which are not by any means artistic. A good picture, regarded as "a thing of beauty," may more easily be reckoned "a joy for ever" than an iron bridge or an unnecessary hotel. Our readers are in a position to know that the policy of the Oldham Corporation in regard to their gas-works administration has not gained universal approbation from critics of such matters; and possibly if the art critic of the *St. James's Gazette* were to see for what the sacrifice made to local art is expended by the Corporation, he might not always be satisfied therewith. The buying of pictures is not often a proceeding void of offence to lookers-on. Even though the task were accomplished in a way to please Mr. Ruskin himself, however, the moral objection to the arrangement would remain. It is as hard to understand why the gas consumers of Oldham should be required to find money for the purchase of pictures for their townspeople, as why their neighbours of Manchester should maintain the Improvement Committee of that city. That pictures ought to be bought for ratepayers is becoming as widely understood—thanks in a considerable measure to the great teacher we have named—as that streets should be lighted. The next thing to secure is a general perception that ratepayers everywhere should be induced to pay with their eyes open for what they want in this way, instead of treating themselves to luxuries at other people's expense.

The Rating of Machinery Bill.

Last Wednesday week the House of Commons did a piece of solid work in discussing and reading a second time the Rating of Machinery Bill; thereby redeeming to some extent its character as a businesslike legislative assembly. The compliments paid on all hands to the House on this performance, in which for a wonder politics were left out of account, do not reflect credit on its usual proceedings. With this, however, we have nothing to do. The Bill in immediate question is a brief but practical measure of three operative clauses, and does not apply to Scotland or Ireland. The third clause, which states that "nothing "in this Act contained shall apply to the rating of water-"works or gas-works," would seem to exclude the whole Bill from mention in these columns; but although gas-making plant is not affected by it, machinery using both gas and water to drive it is particularly mentioned in the principal

clause. The gist of the measure is to restrict the rating of machinery in factories to fixed motors and their transmitting fixtures; all other machines, whether attached to the tenement or premises or not, being exempt. The demand advanced by the supporters of the Bill was for uniformity of treatment, which appears unattainable by any means short of total exemption. Assessment Committees in different parts of the country have interpreted their duty with regard to machinery so diversely, that manufacturers have not known what to expect when establishing factories in various counties. Instances are known of machinery having been heavily rated in one locality, while permitted to go free elsewhere; and in the attempt to define principles in connection with these assessments, the Courts have laid down judgments under which garden implements or domestic knife-cleaning machines might be taxed. In short, the subject is in such a tangle that relief is surely needed. Unfortunately, the rating of machinery is not the only point in regard to assessments that calls loudly for reform; but when the other anomalies of the law and practice of rating will be dealt with, nobody is in a position to say. This thoroughly chaotic state of affairs in connection with rating was urged as an objection to doing anything for the relief of machinery, which it was argued should be considered as part of a comprehensive measure of reform. It was felt, however, that the proverbial advantage of getting a slice of a loaf in preference to going without bread, bore upon this question; and so machinery is to be relieved forthwith, instead of being put off to the far-distant day when Parliament may see fit to try to place the whole business of assessment for the relief of the poor upon a more satisfactory footing. We therefore congratulate factory-owners on their good fortune, which is not to be grudged because there remain plenty of sufferers to complain of the irrationality in other respects of the extraordinary English law of rating.

The Reform of Private Bill Procedure.

ALTHOUGH Mr. Craig-Sellar is gone from the scene of his labours, his spirit seems to linger yet in the House of Commons, and to inspire both official and private members with the desire for altering Private Bill Procedure, which was the study of his later years. It even appears possible that the work that Mr. Craig-Sellar failed to accomplish will be performed without him. There are two schemes for the reform of Private Bill legislation actually before Parliament, one of which is promoted by the Government; and if either plan should be adopted, it will justly be regarded as a testimonial to the man who did so much to focus opinion upon the subject. The private member's scheme is for putting the whole business into the hands of a paid Commissioner, which reads very like an attempt to get rid of a duty that at present weighs heavily on the average unofficial members of both Houses, and has not the very smallest chance of success. Unsatisfactory as the drowsy, bored group of gentlemen who consitute the average Committee may be in the estimation of promoters of Bills, they are always patient, and never set themselves up as dictators, which a "strong" Commissioner might easily do. The public are not in the least disposed to revert to the practice of ancient Greece, and saddle themselves with a lawgiver, even if he is only called a Commissioner. As for the Government scheme, which is for Scotland only, it appears likely that a considerable amount of opposition will be brought to bear upon its details in Committee, if it ever gets so far as that stage. The proposal is to appoint a Commission for dealing with all exclusively Scotch business. Such Scotch Bills as are unopposed will be dealt with as at present; only opposed Bills being sent to the Commission. The objections to this proposal are numerous and weighty. In the first place, it is argued that such a tribunal is unnecessary in view of the fact that it would have to deal with scarcely half-a-dozen projects a year. It would be expensive to establish and work; and it is very doubtful whether it would inspire confidence. The questions of the constitution and remuneration of the proposed Commissioners, of an appeal from their decisions, and the difficulty of localizing interests, are all serious. It is urged that very little gas or water works business would ever come before such a Commission; and that nearly all Scottish Railway Bills are necessarily so connected with the English railway interest that the latter would insist on their being brought up to Westminster for examination in the ordinary way. The matter will come up for discussion in the House of Commons in due course, when all these and other objections, the like of which formerly caused Mr. Craig-Sellar to cast and recast his scheme of reform into a variety of shapes, will be duly considered. After all, there will be the House of Lords to reckon with; and it is quite probable that as the Upper House is quite ignored in this Scotch Commission scheme, it may retaliate in most effective fashion by throwing out the measure.

The Metropolitan Local Authorities and the Water Companies.—The petition of the St. James's Vestry, to which reference was made in the JOURNAL last Tuesday, was presented to the House of Commons on that day.

Messrs. H. and C. Davis and Co., of Camberwell, have just obtained a very large contract for the gas and steam-cooking apparatus for the Kensington Co-operative Stores, about to be opened at Cadby Hall, Kensington.

The Proposed Inquiry into the Management of the Salford Gas-Works.—The petition of the Salford Corporation for a Commission of Inquiry into the management of their own and other Corporation gas undertakings was presented to the House of Commons last Wednesday by Mr. Howarth.

Presentation to Mr. G. Rigby, of Salford.—Mr. George Rigby, who is leaving the service of the Salford Corporation Gas Department to take the post of Chief Accountant to the Pará Gas Company, at Pará, was presented last Saturday with a handsome dressing-case and a travelling-bag, as a token of the esteem in which he is held by his fellow-officials at Salford. It will be remembered that the Company's Engineer (Mr. John G. Newbigging) also went out from Salford.

The Engineering Department of King's College, London, has always had a high reputation; but now, thanks to the munificence of Lady Siemens, a new laboratory for electrical engineering, to perpetuate the name of her husband, and to be called the "William Siemens Laboratory," is to be constructed and fitted with every modern electrical appliance. A new chair of electrical engineering has been established; and the first Professor has been appointed—namely, Dr. John Hopkinson, F.R.S., the President of the Institution of Electrical Engineers.

Presentation to Mr. W. Woodward.—On Friday last a deputation of the workmen waited upon Mr. W. Woodward, at the Gas Offices, Bury, and presented him with a very handsome timepiece. The presentation was made by Mr. Walker, the foreman of the works, who expressed the regret they all felt at the severance which was about to take place. Mr. Woodward suitably replied, and the deputation withdrew. Mr. Woodward entered upon his duties at Bromley yesterday; and is succeeded at Bury by Mr. W. H. S. Gendall, Manager of the Haslingden Union Gas-Works.

Electricity in Japan.—During the past few years the applications of electricity have made great progress in Japan; there being now, says *Industries*, five large companies carrying out the lighting of buildings, &c., from a central station. The stations at Tokio, Kioto, Kobe, Osaka, and Nagoya are reported to have lighting power for 22,300 lamps, 11,000 of which are said to be in use. Besides these, ten other companies have received permission to erect works at Nagano, Kumamoto, Nagasakai, Hakata, Yokohama, Hiroshuna, Shidznoka, Hukodate, and Niigata, with a total power of 16,800 lamps. The first Company was established in Tokio in 1886.

The Supply of Water by Meter in Detroit.—The recent increase in the number of water-meters used in Detroit has brought to light many unjust discriminations that were innocently made under the assessment plan. The American *Engineering and Building Record* gives the following example:—Two manufacturing firms engaged in the same business, and competing for the same trade, were assessed respectively at $600 and $440. The firm assessed at $600 asked to be metered last June; and they have since paid an average of $38 monthly, or at the rate of $456 annually. The firm assessed at $440, or $160 less than the other firm, was metered by direction of the authorities in October, and paid for the months of November and December $384, or an annual rate of $2304, or more than five times the amount paid by the firm which, under the assessment plan, paid most by $160 per month.

Coal in Persia.—In the JOURNAL a few weeks ago, we mentioned that the Shah of Persia had taken steps to introduce gas lighting into his dominions. In view of this innovation, the fact that, according to an article which recently appeared in *The Times*, a coal-field of great extent has been proved to exist in the neighbourhood of Teheran, has considerable interest. The coal has been tested, and experts affirm that it will bear comparison not unfavourably with the best English coal. Another field of excellent quality has more recently been discovered in the Gisakim Hills, less than 50 miles from Bushire. English coal at that port sells at an average price of 43s. 4d. per ton; and it is computed that Persian coal could be sold there, leaving a large profit to the exploiters, for little more than half this price. The total area covered by the coal-fields of Persia is believed to be very vast.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 808.)

THE renewal of activity in the Stock Markets is proceeding; and there has been no complaint of scarcity of business last week. Still, movements have been somewhat irregular. The class of securities affected by the appreciation of silver have been powerfully moved; and the influence of this factor must be felt more or less widely. The Money Market is not quite so easy. The Gas Market has been very active, and many issues have advanced in value. Conspicuous among these are the debenture and preference stocks of the Metropolitan Companies; there being a good demand for high-class investments of this character. The only exception to the general improvement in price is Gaslight "A." Plenty of business was done in it throughout the week, at prices not widely divergent—once touching 249; but the tendency on the whole was rather towards drooping than buoyancy. The "H," on the other hand, though not dealt in, was priced 1½ higher. The 10 per cents., too, have risen considerably; and "J" is quoted level with the rest, as we have often said it might be. When it is borne in mind that the dividend-paying power of the Company must be reduced by the enormous sum of nearly £850,000 per annum before the dividend upon any one of the preference stocks can suffer any diminution, it may be said there is practically not much choice between them. It is the difference between the relative degrees of safety of one man who is ten miles beyond the range of gunshot, and of another who is twelve. In South Metropolitans, all classes have been moderately dealt in, and show a disposition to rise. "C" and the debenture have made an advance. Nothing was marked in Commercials, though we heard of business being done; and the old stock is 1 higher. Among the Suburban and Provincial undertakings, Brentford has been active, and Crystal Palace unusually so; some transactions having been marked in the latter at 201 and 202. Several of the Foreign companies have gone up; and Buenos Ayres and Monte Video are favourably affected by the great improvement in Argentine finance. The Water Companies have furnished very fair business with a good tendency, especially in Grand Junction; and Southwark shows the inscrutable see-saws as usual—the turn last week being up.

The daily operations were: Gas opened firm on Monday, and several issues were active; notably there was a demand for Continental Unions. Gaslight "H" rose 1¼. The position remained unchanged on Tuesday. Brentford old and Continental Union, £14 paid, rose 1 each. Wednesday's business was largely in Gaslight "A" at fairly level figures. South Metropolitan debentures rose 3; and Imperial Continental, 1. Grand Junction water improved 1½. Thursday's operations were chiefly profit-realizing in Imperial Continental. Gaslight "A" was not much dealt in. Monte Video advanced ½. Water was brisker, and Southwark "D" rose 2. On Friday, Imperial Continental had to come down 1, and Gaslight "A" did the same; but many other issues improved. Gaslight "C," "D," and "E" rose 3; do. "J," 1; and Commercial old and European, 1 each. Water was quiet and unchanged. The tendency in Gas on Saturday was good. Gaslight "J" rose 5; South Metropolitan "C," 2½; and Oriental, ¼. Some other issues realized top prices. Water was more active, with a firm tendency.

ELECTRIC LIGHTING MEMORANDA.

The Supply of Electricity by High-Tension Currents—The Board of Trade and Municipal Electric Lighting Orders—The Economy of the Transformer System Denied—An American Opinion of the Efficacy of Competition in Lighting.

THE troubles of the London Electric Supply Corporation in regard to getting their Deptford station to work impart additional interest to the recent inquiry of the New York Senate Committee on the subject of rendering electric supplies safe, the general result of which was recently given in this column. It appears that for the purpose of this inquiry the opinions of several prominent English authorities were obtained in the form of answers to a set of questions prepared by Professor Henry Morton, of the Stevens Institute of Technology. The first query was as to the possibility of safely conveying high-tension currents for lighting purposes underground, and of the safe limit of pressure. Sir W. Thomson and Professor G. Forbes thought it could be done with safety up to 2500 volts, and Dr. John Hopkinson concurred. Mr. W. H. Preece was generally in favour of high-tension currents, but confessed to having experience up to only 1800 volts. M. Fesquet, a French practical electrician, said he had worked with a pressure of 3000 volts. Mr. Preece tried to make gas lighting compare unfavourably in point of safety with electric lighting, by stating that "in London, out of 2338 fires last year, two only were attributed to the electric wire, while gas is credited with 209." If the electricians could only get hold of half the business done by the London Gas Companies, they would not trouble themselves if they were "credited" with a more than proportionate increase in the number of fires. It was shown by Professor Forbes that, so far as London is concerned, the high-pressure transformer system is more popular than its rival, the low-pressure direct-supply system. The evidence adduced to prove this view was the larger aggregate capital devoted to the exploitation of the former. Professor Forbes concludes his statement on this point with the declaration that "at present, and until a storeage battery is found which is cheap, efficient, and durable, most of our municipal lighting in Europe, including Great Britain, will be on the alternate current high-pressure transformer system; and that only in exceptional cases can a low-pressure supply be economically given." Sir W. Thomson says also that the mass of copper required for the economical transmission of electric power to distances of more than a mile is so great relatively to the value of the work done, if the potential be limited to 100 or 200 volts, that the prohibition of higher pressures would ruin the industry. Professor Forbes likewise—and not before it was time—relieves the Electric Lighting Act from the reproach of hindering the progress of the electric light in Great Britain, ascribing the lack of extension of the business to the fact that electricians "resolved to wait until a satisfactory high-tension system should be worked out."

The present action of the Board of Trade under the Electric Lighting Act is giving much anxiety to local authorities who happen to have pending applications for lighting Licences or Orders with the full intention of carrying them out when obtained. These complain that the Board are misled by the greater number of applicants for municipal lighting Orders, who have no intention whatever of acting under those they are now seeking. The only reason why the vast majority of local authorities have taken proceedings under the Act is to keep out unwelcome speculators of the "House-to-House" and similar brands. The cost of an Order to most Corporations is as nothing to the advantage of retaining control over their streets; but this being their only design, they will accept anything else that the Board of Trade think fit to impose. Consequently, when the Board insert in these Orders enormous districts for compulsory supply, require miles of underground wires to be laid before a lamp is lit, and so forth, the applicants smilingly agree. It is playing into their hands in the most satisfactory manner. They know very well that the Board of Trade can give them a nominal right to the water, so to speak, but cannot make them drink. And the more onerous the conditions of these Orders may be, the better for the holders; for they in this way supply ample excuse for their own non-observance. Moreover, supposing a speculative company takes advantage of the fact that any city, although provided with electric lighting powers, has neglected to exercise them during the allotted period, to demand access to the district, the local authority will be able to point to these oppressive conditions, and insist on their would-be rivals having the same treatment. In this way the most adventurous speculators would be choked off. Meanwhile, local authorities who really intend to try a little electric lighting on their own account are sadly worried by the extravagant requirements which the acquiescence of the others has encouraged the Board of Trade in setting up for a standard.

In a paper describing some tests made of the working of a Westinghouse lighting plant presented by the makers to the Johns Hopkins University, Dr. Duncan and Mr. Hasson make out the efficiency of the plant to be about 59 per cent. They remark that domestic electric lighting for the United States is largely a matter of the future—"it is certainly not a matter of the present." The great majority of the lights of this kind in use are in shops, saloons, theatres, offices, &c. Most of the lights wired are employed at one time or another every day; and the proportion borne by the energy supplied to the total capacity of the lamps in circuit is much greater than would be the case in house lighting, where on the average only a small fraction of the possible amount of lighting is actually used. Consequently, the present business of electricians is very different, and presumably more profitable for its bulk, than it would be if they had all the lighting of a town to provide. The authors cite an example of the disadvantage that electricians would encounter in lighting (say) an ordinary dwelling-house requiring a 20-light converter. What with the constant loss of the instrument, and its inefficiency when used for only a fraction of its full capacity, its average duty would scarcely exceed 40 per cent. The reflection of the authors on this discovery is that "it is evident that unless the losses in converters can be greatly decreased, a house-to-house distribution, with a converter in each house, would hardly pay." It would be difficult to heighten the effect of such a declaration by comment or paraphrase. The authors, moreover, in order that their position may not be misunderstood, proclaim their conviction that "if gas is to be really displaced and serious competition with it is to be attempted, a different system of distribution must be worked out." They suggest replacing numerous small converters by one large converter supplying a comparatively extended district.

In illustration of what has been said in other portions of the JOURNAL with regard to the credulity of Americans respecting the universal efficacy of competition in reducing prices, we may cite a remark of a Mr. Victor Rosewater while discussing in a newspaper the advisability of municipal ownership of street electric lighting plants. The writer gives figures to show the irregularity of the charges made for this service by lighting companies, many of which he classifies as "a great imposition." He says that "the efficacy of competition as a regulating

influence is something almost implicitly confided in by the American people. They do not recognize the monopolistic character of certain industries. Now, in many instances it was stated in the answers received from the various cities, that the city was illuminated by contract with two, and often three, different electric lighting companies, but in no single case was any variation in the charge noted; each company received the same price for light as the others. The only explanation which can be made is that by some combination the same price was fixed for each company, and that the latter divided the territory according to mutual agreement. The impossibility of competition in this line of business could not have been more clearly illustrated." Unfortunately, teaching such as this is like crying in the wilderness.

ROBINSON ON THE GAS-ENGINE.*

When a short time ago we reviewed Slingo and Brooker on "Electrical Engineering," we perceived in that admirable book a response to the demand of candidates in the examinations of the City and Guilds of London Institute for a trustworthy guide to the subject treated of, which is a popular study just at the present time. Now we have, in the work of Mr. W. Robinson on "Gas and Petroleum Engines," a further instalment of technical literature of the same novel class, although the two books do not belong to the same "series." This latter consideration is, however, a small matter; meaning no more than that a purchaser must go to Messrs. Longmans for one book and to Messrs. Spon for the other. The chief thing to think about in regard to these books is that in them the student may at last hope to find fresh, pointed, and reliable assistance in getting up the subjects to which they are devoted, for the purpose of the City and Guilds examinations. It is, in fact, the examinations that have produced this class of books; and their superior directness and modernity, if the expression may be permitted, may be taken as testimony to the exactness demanded by the examination system. When there is nothing like an examination to look to as testing the value of his teaching, a compiler of a so-called technical handbook may fill his pages with all manner of twaddle. For years it has been the common practice for the hangers-on of an industry to undertake the compilation of books relating to it, in the same way that men who had failed in other occupations used to take to school-keeping as a last resource. We could name many books put together by writers of this character, which are nothing more than catch-penny frauds. It would be difficult to exaggerate the evil done by such publications. Not only do they obtain on false pretences the hardly-earned money of the poor student, but they also tend to dwarf or misdirect his awakening desire for instruction, and thereby to consign him to the hopeless army of smatterers from whom nothing good ever comes. The young engineer has a craving for books, which his small means frequently condemn him to try to satisfy from second-hand bookstalls. It is a bitter disappointment when one of his rare purchases from a London publisher turns out to be a delusion, as so many do that are ordered without advice, and merely from their titles. Fortunately for the student of to-day, however, he has a means of distinguishing a good from a bad book—which is the next best thing to having the good book itself—in the questions set by the City and Guilds examiner. These tell him what he ought to know; and when he discovers that a book which pretends to be a guide to the special subject in which he is interested fails to supply the information needed to satisfy the examiners, he promptly casts the useless volume aside. This standard is really a precious aid to the student, for without it he might load his brains with much that is not the knowledge he requires, either to satisfy technical examiners or to make progress in his calling.

Having laid down so much of a general character with respect to the choice of books by the technical student who has learnt to accept the examinations of the City and Guilds of London Institute as a convenient and reliable standard of instruction, let us see how far Mr. Robinson satisfies the test in his treatise on gas-engines. He is personally worthy of respect, to begin with, inasmuch as his credentials are undeniable. In his preface, he engages attention by philosophically leading his readers to the conception of the internal-combustion engine as a radical division of the order of heat-engines. He thus places fundamental principles in the forefront of his work, and makes it manifest that he means to treat the subject otherwise than by collecting manufacturers' catalogues and chattering about gas-engine driving in the style of a newspaper reporter. The author acknowledges very fairly that Professor John Perry's lectures on the gas-engine form the basis and origin of his book, and that Professor Silvanus P. Thompson has helped him with suggestions and information.

In his introductory chapter, Mr. Robinson explains the strength and weakness of the steam-engine; the latter being its wastefulness as a means of converting the energy of coal into motion. In a piquant sentence the author says that "the coal resources of England cannot be said to have been appreciated earlier than by our grandfathers; and at the present rate of consumption our grandchildren will see the end of our accumulated stores of enery in this form. The spendthrift talks of the new fortune that will come to him—anyhow, somehow—when his present fortune is spent; and it is customary for *pseudo*-scientific people to talk of some store of energy, in another form than that of coal, which will make its appearance in the world when our present store is spent. But we confess that, with a knowledge that 96 or 97 per cent. of the energy stored up for us is now being utterly thrown away by the people who burn coal in steam-engines of small power, . . . we feel that we are simply spendthrifts placing a vague dependence on the appearance of a new fortune when our present one is dissipated." If we are spendthrifts, however, we are not wilfully so, and would gladly hail the discovery of more economical methods of obtaining mechanical power. Mr. Robinson declares that the steam-engine is practically perfect as a machine; its wastefulness being due to the small range of temperature utilizable by it in its capacity of a heat-engine. In this respect it is already susperseded by the gas-engine, in which unfortunately practical considerations lead to great waste by means of the water used for cooling the cylinder. Mr. Robinson refers to the cost of the unit of heat when supplied in the form of coal gas; and he goes on to introduce oil-gas and petroleum engines.

In his treatment of the internal-combustion engine, which he begins in his second chapter, Mr. Robinson reverses the ordinary practice of writers on similar subjects, and instead of going into the historical part of the question, he directs his reader's attention at once to the Otto gas-engine, as being "the most common type of internal-combustion engine." He adopts this plan for the reason that "the ordinary reader would have considerable difficulty in understanding the significance of certain points in the history of this class of motor, unless he were acquainted with the working of at least one of the best modern forms." There is good sense in this method of teaching from the known to the unknown. The working of the Otto engine is explained by reference to a model constructed in the workshops of the Finsbury Technical College, in which the parts are reduced to their simplest expression. The performance of the engine, as shown by an indicator diagram, is exhibited, after which the various details of the mechanism are explained, and modifications of the original type described. The following chapter informs the reader that the four operations of the Otto cycle were known to, and described by, Beau de Rochas in 1862, and goes on to describe Atkinson's inventions. With reference to the Atkinson differential engine, which attracted so much attention at the Inventions' Exhibition in 1885, it is stated that "the patent was taken out, the engine designed, patterns made, and the first engine working in the exhibition, all within one month." Mr. Robinson evidently thinks very highly of the Atkinson engine, especially in its later forms. He describes favourably the "Simplex" gas-engine, one of which, developing 100-horse power with Dowson gas, was shown at the Paris Exhibition last year. Under proper conditions, the duty of this type of engine, with this kind of fuel, is stated to be 1 lb. of coal for a brake horse-power per hour. Then the author goes into the matter of petroleum engines; first explaining the driving of ordinary gas-engines with carburetted air. He then describes the Priestman oil-engine, which he calls "the new prime motor of 1888;" and afterwards proceeds to treat of the Spiel naphtha-engine. The novel type of vapour motors adapted by Messrs. Yarrow and Co. for launches of the "Zephyr" class is dealt with here for the first time by an independent critic. Generally it may be said that Mr. Robinson endorses Messrs. Yarrow's determination of the comparative efficiencies of steam and petroleum vapour for equal fuel consumption as being 5:9. He mentions the Bailey-Friedrich oil-engine; but he omits the Hargreaves tar engine, which is a pity.

Having thus touched upon the principal combustion engines which the student may find at work to-day—not, as he admits, exclusively, but only in a way to distinguish the leading types and help to the classification and understanding of others—Mr. Robinson dips a little into history, for the purpose of showing how these useful inventions were preluded. He soon comes to caloric or hot-air engines, and so back to modern examples again. He does not think highly of this kind of engine, and consequently soon leaves them in order to discuss early gas-engines, especially the Lenoir, through which he gets to the Otto and Langen, with its now historical "pile-driver" action. Having described all these types of motors, Mr. Robinson rearranges them in the two great classes of compression and non-compression engines. He discusses regeneration, and also devotes a good deal of space to the detail of ignition. Not until all these practical examples of successes and failures have been dealt with to the length of 233 pages, does the author quit execution and treat of the accepted theory which underlies it. In this part of his work, Mr. Robinson is very thorough; explaining, by the aid of numerous examples, the physical and mechanical principles with which designers of motors have to reckon when the quality of their performance comes to be determined. The construction and use of indicators are set out at rather unnecessary length, seeing that much of the matter has no more to do with gas than with steam engines. The construction and use of absorption brakes are explained more concisely. After this we come to a disquisition on energy,

* "Gas and Petroleum Engines: A Practical Treatise on the Internal Combustion Engine." By William Robinson, M.E., Senior Demonstrator in Applied Physics and Electrical Engineering in the City and Guilds of London Technical College, Finsbury, &c. Illustrated (Finsbury Technical Manuals Series). London: E. and F. N. Spon; 1890.

followed by chapters on combustion, fuels, the different kinds of lighting and fuel gases in common use, and a great variety of other matters interesting to the student of heat-engines. Finally, by way of practical conclusions, Mr. Robinson declares that "in the internal-combustion engine we should seek for (1) compression of the charge, within certain limits, before ignition; (2) high speed of piston; (3) great expansion of the burnt products; and (4) the application of the regenerator principle to utilize the heat usually rejected with the exhaust gases as well as that carried away by the jacket-water." This statement no doubt formulates succinctly all that is now known of the directions in which gas-engines may be improved.

We can warmly recommend this book to all who may be interested in the subjects of which it treats, who constitute a large and increasing number of engineers and power users, as well as all gas engineers and manufacturers. The volume contains 535 pages of well printed and illustrated matter, and is furnished with an ample index.

Mr. A. Marston has been appointed Secretary and Manager of the Willenhall Gas Company, Staffordshire—a position formerly occupied by Mr. D. Lees.

Mr. James Lees, of Goole.—The proprietor of the *Hastings and St. Leonards Times* offered a prize of five guineas for the best essay on the abolition or continuance of the local coal dues of 2s. 6d. a ton. No essays were sent in supporting the continuance of the dues. The adjudicators awarded the prize to an essay which proved to have been written by Mr. James Lees, formerly Manager of the Goole Gas and Water Works. It will be remembered that Mr. Lees met with a serious accident from an explosion of fireworks material on Jubilee day, by which his sight was believed to be destroyed. He, however, recovered it sufficiently to enable him to take a temporary engagement at St. Leonards. Just before his accident, he carried off a prize for an essay on the domestic use of gas.

The Leyton Sewage Disposal Works.—At the meeting of the Junior Engineering Society on the 11th inst., Mr. J. G. Browning read a paper on the "Leyton Sewage Disposal Works," describing very fully the methods there adopted for treating the sewage. Up till 1883 the sewage of the town was dealt with by simple filtration through straw and charcoal, at which date treatment by sulphate of alumina was introduced, but abandoned twelve months later on account of its expense. Mr. Hanson's chemical process was then substituted, and has since been worked with satisfactory results down to the present time. The chemicals used in this process are lime and a powerfully-oxidizing powder prepared from alkali waste containing both hyposulphites and sulphate of lime. About 16 cwt. of lime and 3 cwt. of the powder are used per million gallons of sewage; and the resulting effluent is free of offensive odour, and is discharged into the River Lea. The quantity treated per 24 hours averages about 1½ million gallons, the main part of which flows into the mixing and settling tanks without requiring to be pumped. The sludge obtained, amounting to 110 tons per week, is pressed into cakes in the usual way, and is used as manure, though farmers do not consider it sufficiently valuable to cart away to any considerable distance.

Coal in the South-East of England.—At the Society of Arts last Wednesday, Mr. W. Whitaker, F.R.S., lectured on the subject of the recent discovery of coal at Dover, as bearing upon the existence of coal in the south-east of England. Mr. Whitaker began by quoting the views of the first Director-General of the Ordnance Survey (Sir H. De la Beche), to the effect that from the movement of the older rocks many a mass of coal measures might be buried beneath the oolites and cretaceous rocks on the east. He then pointed to a geological map, showing that on the east there was a set of coal-fields, with other rocks older than the coal measures, along a curved line, from the neighbourhood of Dortmund and Elberfeld, by Aix, Liége, Namur, Charleroi, Valenciennes, Douai, and Bethune, towards Calais, whence the line had now been extended across the narrow sea to Dover, where success had crowned the experiment of Sir E. Watkin and Professor Dawkins. On the west there were our coal-fields of South Wales and Bristol. In the Continental tract mentioned, while the coal measures were mostly at the surface in the eastern part, in the western they were covered by newer rocks. Why should not the like occur in the English tract eastward from the part where the coal measures were at the surface? It should be noted, he said, that there was a sign, though slight, of another possible line of underground coal measures, starting on the east from the Saarbruck coal-field, south-west of Mayence, and ending perhaps on the west in the unprofitable culm measures of northern Devon and Cornwall. Here we had the ends only, with no evidence between; but these ends both came just south of the ends of the former line. It was to be hoped that the Germans and French would see to this line; and then, if coal measures should be found underground in the neighbourhood of Amiens and of Dieppe, their extension might be looked for westward into Hampshire and Dorsetshire. Having referred to the discoveries at Kentish Town, at Meux's Brewery in Tottenham Court Road, at Ware (Essex), at Cheshunt, at Streatham, and elsewhere in the neighbourhood of London, Mr. Whittaker said the discovery in Kent last February did not in any way surprise geologists.

TECHNICAL RECORD.

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

The Twenty-sixth Half-Yearly Meeting of this Association was held at the Newcastle and Gateshead Gas Company's Offices last Saturday. The PRESIDENT (Mr. R. Bridge, of Doncaster) occupied the chair; and though there was not much business to be brought before the members, there was a larger attendance than usual.

NEW MEMBERS.

The following gentlemen were first elected as members of the Association:—Mr. John Holliday, Assistant-Manager of the Carlisle Gas-Works; Mr. H. Blackwood, Assistant-Manager of the Sunderland Gas-Works; Mr. David Terrace, Manager of the Middlesbrough Gas-Works; Mr. W. Airth, Manager of the Morpeth Gas-Works; and Mr. E. Shaul, jun., Manager of the Penrith Gas-Works.

THE PRESIDENT'S OPENING REMARKS.

The PRESIDENT said it was not his intention to trouble the members with a long speech. He must congratulate them first of all on the number of gentlemen who had that day joined them, because it showed that there was some health in the Association yet. This was a very good point; proving, as it did, that the North of England Gas Managers' Association was not going down. As this was probably their last gathering before the meeting of The Gas Institute, he would like to say a word or two upon it. He had not the opportunity of being at the meeting of the Council the previous day; and so he did not know the exact situation. But he hoped that some of the friction which had been in existence for some little time would be rubbed off, and that they should fall back into the old good times. He did not like the idea—it was not nice to him—to have two Gas Institutes; and he thought, if they could only meet together, both sides (if there were two sides), and shake hands and be as they were, it would be very much in the interest of gas managers all round. He did not know what was likely to be done; but he hoped that every member of the Council would strive to bring the former happy times about again. They had in Newcastle evidence of the life of the electric light. It was stirring amongst them; and if it could live in Newcastle, with gas at its existing price, there seemed to be some hope that electricity might advance But whatever hopes there might be, he thought they need not be frightened. As he foreshadowed in his opening remarks at the last meeting of the Association, electricity would evidently take a place; and it was already taking a place in Newcastle. He was informed that the price for electricity in the city was something like 6d. per unit. This appeared to be very much dearer than gas at anything like 2s. per 1000 cubic feet; and he believed it was 1s. 9d. in Newcastle. But if the electric light could live in that town, they in the country who sold gas at about 3s. would have to look around them, or else the brilliant, meteor-like light would shoulder them out. This was a subject for them to consider. But while they had in the North of England such men, for instance, as Mr. Warner, looking after their interests, he did not think they need fear electric light. Mr. Warner was going to bring before them, he understood, a very interesting paper indeed, from which they would no doubt learn something. This was probably the last time he (the President) would address them as President; and he desired to thank them very much for the kind treatment they had rendered to him during his year of office. It had been a real pleasure to him; and it had not been much of a toil.

The accounts for the past year having been approved,

Mr. W. J. WARNER (South Shields) read the following paper, entitled—

NOTES UPON DISTRIBUTORY PLANT.

I very much regret not having been in a position to comply with the request of your Committee to contribute on the present occasion a paper to this Association. Though not in possession of matter of sufficient importance for a paper, I had a few notes which I thought might interest you, and draw forth some expression of opinion, which, backed by observation and experience, might be of value at a time when an attempt is being made by the users of steam-rollers to remove from themselves the responsibility attached to its use.

In a paper on the subsidence of gas-mains, by Mr. Drewry, of Cleethorpes, read at the recent meeting of the Eastern Counties Association, the writer gives his experience with mains laid in loose soil subjected to tidal influences and disturbed by sewerage works—resulting in a considerable subsidence of the main and its ultimate fracture. Reference was made in the discussion of the paper to the general disturbance of gas-mains by "the necessities of domestic civilization," so termed by Mr. C. E. Jones, of Chesterfield—viz., the "water-carriage system, sewers, the multiplicity of telegraph, telephone, and electric-lighting poles, and electric lighting mains." It will be observed that reference here is only made to the disturbance of the ground from these operations—the actual doing of the work. Beyond these disturbances within, if they may be so termed—the cutting of the trenches, inadequate shoring, improper filling-in, and the dis-

turbance of the joints by such operations—there is the disturbance from without, or from the surface of the ground—the road-making operations, the general traffic over the ground, and the passing of heavy loads over the surface of the road.

Having a record, extending over some years, of the defects found in mains and pipes other than those of an ordinary character, I have arranged them in a tabulated form. Though this scarcely covers the whole of the ground, yet it may be of some value as a contribution to the subject. These entries of the whole are divided into five divisions, with the number of breakages in each, and the percentages, the sizes of the smallest and largest pipes, and the mean diameters, as follows:—

No.	Cause.	No. of Breakages.	Percentage of Whole.	Sizes of Pipes. Max. Inch.	Min. Inch.	Mean. Inch.
1.	Bad castings	7	6·48	12	1¼	3·79
2.	Drainage operations	51	47·22	6	⅜	2·29
3.	Heavy weights passing over roads	16	14·82	12	2	3·62
4.	Steam-roller passing over roads	17	15·74	6	¾	2·40
5.	Unknown	17	15·74	8	1	3·00

Two of the latest reports are as follows:—"March 11, 1890.—Jarrow district: Escape in a ¾-inch service; connecting-piece drawn from main by pressure of steam-roller; the pipe end quite *bright;* pipe bedded in soft clay." "April 2, 1890—Shields district: Escape up lamp pillar; opened out the service, and found it extended from the end of the main; a connecting-piece drawn from the socket; the end of pipe was as *bright as silver;* steam-roller was there a few days prior to escape being reported; pipe laid in clay." I am told there have been other cases in these districts; but till that reported on March 11, when the pipe was taken out of the ground "quite bright," attention was not directed to the matter as the cases were only considered as ordinary disturbances of service-pipes. But these cases of brightly burnished pipes attracted attention, and were reported to me shortly after the other case was found. One of the pipes I have here on the table; the other, unfortunately, has been mislaid.

The general experience of an excessively heavy weight passing over mains and pipes is drawn joints and fractured pipes, caused through the pipes being laid in a yielding soil, or in one of varying densities, or over an unequal rocky surface. It is not, I believe, an uncommon opinion that the disturbance of the mains and pipes is confined to the direct downward pressure of the weight—that is to say, that a heavy casting, or traction engine, or a heavy steam-roller passing over mains and pipes will affect only those immediately under the weight. But may there not be other disturbances from the same cause not so obvious, being further removed, but still directly traceable to this downward pressure? There must of necessity be a lateral disturbance of the subsoil. In a case under my own observation, there were yards of guttering, curb, and concrete pavement forced up along a line parallel with the track of a steam-roller about two yards away from the nearest edge of the roller; thus proving, if proof were necessary, in the clearest manner, that there are other disturbing movements than those of the direct downward pressure of the moving weight. The injury then may be more remote, and the cause of a more complex character than is generally assigned to such disturbing influences. The ultimate effect may be a general and permanent settlement of the plant till a further disturbance of the ground takes place; but there may be (and it is to this that we should direct attention) such an elasticity in the ground and plant, or in the plant alone, that a prejudicial action may be maintained by the ordinary traffic over the road, and so affect the joints of the pipes. In other words, the compression of the ground in which the pipes are laid may not only cause an immediate disturbance of the joints and breakage of the pipes, but may throw such strains upon the plant that there may be a deteriorating action continued, accompanied by a constantly increasing quantity of gas unaccounted for—an increase which might baffle every attempt to discover the cause of the loss, but which may be accounted for by a general deterioration of plant from the vibratory action of a steam-roller. If the pipe shown may be taken as a true indication of the otherwise unseen action upon the mains and pipes, the fractured pipes and the drawn joints of mains, though more dangerous, are of little consequence, when compared with this action, as they will soon tell their own tale and get repaired. But the other necessitates a constant careful watchfulness and expense, which, I may say in passing, is not dreamed of by the promoters of electric lighting. Whether such deterioration is going on, and whether it will be continuous, must be a matter of observation. Doubtless with the repeated rolling of the ground, it will become more consolidated, and therefore better able to resist undue action and excessive pressure when so consolidated. A general inspection, repairing, and testing of the plant may again reduce the unaccounted-for gas to a moderate percentage of the make.

Though, in the percentages given, the steam-roller injuries are lower than the drainage operations, yet the roller may have helped to swell the latter. However, this fact stands plainly out—that nearly 70 per cent. of the injuries to the distributory plant of a gas undertaking arise from the operations of local authorities; and if there be a still further general deterioration, it behoves such authorities to carry on their work with much greater watchfulness than has been sometimes done—to shore, and fill in their drainage trenches with more care; and to use the roller over the ground in the forming of new roads *before* the pipes are laid, thus avoiding any greater settlement than there must of necessity be. I would also suggest that, in the carriage of excessive heavy weights over the roads—such as a casting drawn by a team of 25 horses—there should be a previous notice given to the local authorities, and the route to be taken decided on and registered. Such a course is justified by the fact that about 16 per cent. of the injuries recorded were caused by this work; and we may fairly assume that a portion of the per-centage of "unknown" was from the same cause.

Now what is the remedy—that to which I directed attention some years since, viz., districting and sub-districting a town as far as it can practically be done, and isolating and testing the mains. Since my paper was read, I believe much has been done in this direction. Papers have been read upon the subject abroad; and the latest patent is that of the combination syphon test-box for this purpose, by Mr. Lyon, of Cosham. In the meantime closer attention should be given to the syphons than, I believe, is generally done. They should be sounded at regular intervals; and the depth of water found entered in a book and compared. Thus the syphons may become indicators of the condition of the mains; and through them the leakage traced to its source. This will not, however, be equally serviceable in all soils. Then there is that beautiful, sensitive, and serviceable machine—the governor, which may be made to do excellent service in this work if closely observed, as it will give a very good indication of an increased flow of gas into a district; and for such work, I believe that form which is manipulated by counter-balance weights is the best.

Discussion.

Mr. W. Ford (Stockton) said he was afraid that what little information he could contribute was almost all contained in the paper which Mr. Warner had so carefully prepared. Mr. Warner made no remark as to whether, since steam-rollers had come into vogue, he had adopted the ordinary method of laying the service-pipes and mains deeper. Some years ago they had very great trouble with the steam-roller in Stockton; and it necessitated considerable re-laying of their pipes. Since then they had had very little trouble. Mr. Warner said that something more than downward pressure was to be attributed to the steam-roller. It was natural that the surface might be a moveable subject; but still the under ground might be quite firm, and the service pipe or main would receive no damage from the steam-roller. If ordinary care was exercised in the laying of mains, a great amount of trouble and anxiety to gas companies and corporations would be avoided. He was, however, only stating his own experience of the last fourteen or fifteen years. In consequence of the precautions they had taken in the deepening of their mains and service pipes, the leakage, which, before the era of the steam-roller (some 16 to 21 years ago), was 24 per cent.. had been reduced to an average of 5 per cent. for the last few years. So that he thought, with care, where steam-rollers were in existence, gas managers might reduce the 'eakage, independently of the action of the local authorities.

Mr. Pettigrew, Gas Engineer to the North-Eastern Railway Company, said he found that his services were often pulled out, but seldom drawn. The weight actually dragged them out, and broke the mains at the place where they were connected. He had found pipes, 6, 8, 12, 14, and 20 inches in diameter, drawn sufficiently for his hand to be passed between the two; but this was caused by subsidence of the soil. He had constantly to be cutting out and putting pieces into the mains, but not into the services. Their services were laid in pitch boxes, not deep; and they always discovered, where a weight went across a pipe, it was downward action that took place—the pipe was broken, but never drawn.

The President said he was sure they were very much obliged to Mr. Warner for his paper. Four or five years ago, he had some experience of the action of the steam-roller. Some time previously a new sewer had been laid in the street, below the gas and water mains; and evidently a subsidence took place below these, or rather on one side of them. When the roller was put to work there, it broke first the water and then the gas pipe. The water-pipe was 3 inches in diameter, and the gas-pipe 2 inches. The water carried the gas down into the sewer below. It was a street something like 500 yards in length; and the gas entered the cottages on one side of the street, through the drains. They did not observe the escape in the street; and when they became aware of its existence, they could not find it. They had to cut the street at both ends and isolate it, and follow the main until they found the leakage. This was caused by the subsidence of the subsoil, and the steam-roller running over the top. The result might have been disastrous; but happily they discovered it before very serious consequences took place. He did not understand Mr. Warner to say that the service was drawn asunder, but that there was a motion, an actual draw, by the passage of the roller over them—a sort of lateral motion. He himself had seen the kerb of a street puff up by the passage of a steam-roller 3 or 4 feet from it; and in that case, there must have been a lateral motion of the soil underneath the surface. He had a 2-feet main laid some little time ago; and the trench was filled up during wet weather. No portion of it was less than 4 feet deep; and yet

the pressure of the steam-roller lifted the pavement 5 feet away. This must have been a lateral motion. Gas-pipes should be laid very carefully. He thought Mr. Warner's paper would be worth perusal, and they would no doubt profit by it.

Mr. PETTIGREW said that at the last meeting of the Association, he put before the members a pipe modelled to prevent drawing; and he thought it would be a very good thing to design a pipe which, when it moved in a lateral direction, would tighten itself.

Mr. WARNER showed a service-pipe which had been drawn from the socket, and burnished by the action it had undergone. He thought the burnishing must have been done by moving backwards and forwards. He exhibited it, he said, just as it was removed from the ground; and it was proof positive that there must have been vibration upon it. This was not the only case. He had one similar to it; and on looking through some pipes on the previous day, he saw there were others. It was not simply a breakage; but a breakage first, and then a vibration upon it. Alluding to Mr. Ford's remarks, he said it would be almost a matter of impossibility to take up 60, 80, or 100 miles of mains and relay them. But, of course, as mains were relaid, or new ones were being laid, precautions could be taken to place them at a greater depth. As, however, their President had remarked, this would not meet their case entirely. Though he went down 4 feet, yet there were deeper trenches—sometimes three times that depth—for sewage pipes. It would not avail them to go farther down, unless care were taken in filling in the trenches. The nature of the ground had something to do with it, undoubtedly. A surveyor of a Tyne district told him a short time since that he knew of a case where a steam-roller sank to below the axle. If this were to happen, how could their pipes escape damage. He congratulated Mr. Ford upon his being able to bring his unaccounted-for gas so low. He did not know that it was a general experience; but he himself nearly approached 5 per cent. a few years ago. He, however, found the leakage had been growing year after year since the steam-roller began to be used. With reference to this percentage, though it was scarcely the matter under consideration, he might remark that it depended entirely upon how they dealt with it—upon what, for instance, they considered the amount consumed in public lighting. Until they obtained fixed figures for this, he thought they were not able to deal with the percentage except upon broad grounds.

Mr. FORD observed that his decrease had been accomplished under similar conditions to those under which he had 24 per cent. of leakage.

Mr. WARNER remarked that there was still the question of whether the quantity had increased or decreased as well as the percentage. He was not altogether clear with regard to Mr. Pettigrew's observations. He thought he showed first that he did not know of any drawing of the joints of pipes.

Mr. PETTIGREW said his remark was that it was the weight—the vertical pressure—which caused a pipe to loosen, not the drawing pressure; that the pressure bent the pipe downwards, and generally broke it.

Mr. WARNER did not see that, as a rule, the pipes should be broken. It was the joint which gave way. The President's remarks were, of course, above criticism; but he might say that they bore out entirely his own experience in these matters. He thanked the members for their reception of his paper.

Mr. HALL (West Pelton) said he wished to add that he found an efficient method of preventing the drawing of service-pipes to be to place (after the connection was made, and the trench filled in to the level of the pipe) several stones alongside the connection, and then, when a subsidence took place, the pressure came upon the stones, and not upon the pipe. If the place were opened years afterwards, there would be a cavity, but no fracture. He had found this in numbers of cases. The subsidence did not take place in the solid ground, but where the connection was made.

ELECTION OF OFFICE-BEARERS.

The PRESIDENT intimated that the Scrutineers' report showed that the following gentlemen had been elected to office for the ensuing year:—President, Mr. W. Hardie, jun., of North Shields; Vice-President, Mr. J. H. Cox, jun., of Sunderland; Secretary, Mr. W. Hardie, of Newcastle-on-Tyne; Auditor, Mr. J. H. Penney, of South Shields; Committee, Mr. W. Ford, of Stockton, Mr. J. Hepworth, of Carlisle; Mr. T. Bower, of West Hartlepool; and Mr. C. Sellers, of York.

Mr. SELLERS said he wished to be excused from taking office, as he lived too far away to be able to attend the meetings.

The PRESIDENT expressed the deep regret with which he heard Mr. Sellers's request.

Mr. SELLERS said he felt a little bit under a cloud. He knew that certain gentlemen in their profession looked at him rather askance, as having been the means of causing the division which existed in their body; and therefore, until that disunion was got rid of, he thought he would be better out of office.

Several gentlemen having disclaimed the notion of differing from Mr. Sellers as a member of the North of England Gas Managers' Association, and it having been pointed out how awkward it was to put another gentleman on the Committee when members had voted for Mr. Sellers, not knowing that he would not serve, Mr. Sellers intimated that, for this reason, he would accept office.

PLACE OF NEXT MEETING.

It was agreed that the next half-yearly meeting should be held at North Shields.

VOTE OF THANKS.

Mr. J. H. COX, sen. (Sunderland) proposed a vote of thanks to Mr. Bridge for his services as President.

Mr. W. HARDIE, jun., the President-Elect, seconded the motion, which was unanimously adopted.

The PRESIDENT briefly acknowledged the compliment.

This concluded the business portion of the proceedings.

VISIT TO THE NORTH-EASTERN RAILWAY COMPANY'S GAS-WORKS.

Waggonettes were waiting outside the offices, and the company drove across the High-Level Bridge to Gateshead, where, after threading the narrow and tortuous streets of the grimy town, they alighted at the gate of the gas-works of the North-Eastern Railway Company. Mr. Pettigrew, the Engineer, explained that the Company supplied gas from there to all their stations, yards, and works within a radius of four miles, and that their yearly output was about 90 million cubic feet. The works stand on a steep slope overlooking the Tyne, and are about as much "cribbed, cabined, and confined," as gas-works could well be. In addition to want of space, the works are under the further disadvantage of being intersected in two places by independent lines of rails, situated in deep cuttings across which the piping has to be carried. They are far from being of modern construction; and although Mr. Pettigrew was most assiduous in explaining everything, the visitors did not profit much by what they saw. The plant consists—stated in the order in which it was shown—of a new sulphate plant capable of producing 8 tons of sulphate per week, by Messrs. R. and J. Dempster, of Manchester, in connection with which a locomotive boiler, burning breeze, is used—the high chimney of the boiler giving a forced draught; a retort-house in three sections, the last of which, containing five ovens, with seven mouthpieces each, fired upon the old system, is not quite completed, and has never been in use; a Beale's exhauster of 25,000 cubic feet per hour capacity, driven by steam, by Messrs. Laidlaw and Son; a governor-house with four governors, by Messrs. W. and B. Cowan; a station meter of 25,000 cubic feet capacity, supplied by the Gas-Meter Company, of Oldham; and two gasholders of 165,000 and 184,000 cubic feet capacity. The new retort-house, it may be mentioned, is built on the site of an old gasholder tank; and there was difficulty in getting the foundations of it laid, as the work had to be done immediately under the shadow of the retaining wall of the goods yard, which at this spot is 50 feet high.

The company afterwards drove back to Newcastle, and dined together in the County Hotel. Mr. Bridge presided, and the usual complimentary speeches were made; Mr. J. T. Jolliffe, of Ipswich, proposing the toast of "The North of England Gas Managers' Association," and Mr. Sellers that of "Kindred Societies."

The United Asbestos Company, Limited, whose chief offices are at Dock House, Billiter Street, E.C., have recently opened an additional branch house at Provident Buildings, Clare Street, Bristol. The Company have now branch establishments in Glasgow, Newcastle-on-Tyne, Manchester, Liverpool, Cardiff, Bristol, Paris, and St. Petersburg.

The Public Lighting of Paris.—The sum set apart by the Municipality of Paris for the public lighting of the city during the current year is 782,750 frs., of which 100,000 frs. will be devoted to experimental lighting. At the meeting of the Municipality on the 7th ult., it was determined that the electric lighting of the Boulevards should be continued, by way of experiment, until April 30, 1891; the Council being unwilling to come to any definite decision on the matter before the Companies supplying the light have had an opportunity of improving it. It is pleaded that the lighting was started too precipitately, with inadequate appliances, the result of which has been the occurrence of a large number of failures. In connection with gas lighting, it should be mentioned that the lighting of the Place de la Bastille has lately been vastly improved by the use of high-power lamps and burners. Many of our readers will doubtless recollect this large open space at the east end of Paris, with the Column of July in its centre. The convergence to this point of several main thoroughfares, with the large amount of cross traffic necessarily resulting, makes efficient illumination after nightfall a matter of the very highest importance. The superficial area illuminated is 27,384 square metres, or roughly 33,000 square yards; and 42 lamps are employed for the purpose. Of these, 33 consume 42·5 cubic feet, and the rest 26·5 cubic feet of gas per hour. The total consumption per hour is 1636 cubic feet, or rather more than 20 cubic feet per square yard of surface, the light distributed over which is equal to something like 12,000 candles. It is difficult, without a plan of the area, to give an adequate idea of the arrangement of the lamps. It must therefore be sufficient to say that they are so disposed as to ensure well-distributed lighting. Around the column in the centre of the *place*, there are eight lamps. Seven are upon refuges; thirteen are at the angles of the large streets leading into the square; and the others are in situations where they will do good duty. The effect of the whole is excellent, and is in the highest degree creditable to the officials of the Municipality under whose supervision the change has been effected.

YEADON AND ADGIE'S PATENT GAS-RETORTS.

From the days of Murdoch and Clegg, at the beginning of the present century, gas engineers—among them being Brunton, Scott, Grafton, and others—have vainly endeavoured to obtain a complete and satisfactory solution of the problem of the the mechanical stoking of gas-retorts. The position of gas producers in this respect up to now is exactly shown by the following extract from the chapter on "Machinery for Drawing and Charging Retorts," in the first volume of "King's Treatise on Coal Gas":—

Stoking by mechanical means, in one form or another, has occupied the attention of engineers from the earliest days of gas lighting. The objects sought to be accomplished are the more scientific and perfect carbonization of the coal, resulting, as might be anticipated, in a larger gas production, of a purer quality, and of a higher illuminating power; and the cheapening of the process of gas making by the employment of machinery in lieu of hand labour. Inventors have also had the objects in view of mitigating the laborious work of the stoker, or rendering it unnecessary in its present form, by supplanting hand labour altogether, or reducing it to the lowest minimum possible—substituting machinery in its stead; thus placing gas suppliers, whether companies or town's authorities, beyond the influence of strikes of workmen, and the annoyance and loss attendant thereon.

Most leading gas engineers are agreed upon the correctness of the results obtained from early experiments—viz., that "the greater the rapidity with which the distillation was effected, the greater was the quantity of gas produced from a given weight of coal, and (volume for volume) the more intense the illuminating power of the gas. The quantity of liquid product was also lessened and the weight of the residual coke not so great." The large loss of gas and time caused by the charging and discharging of the retorts, and the important advantage of working the retorts with a thin stratum of coal, are points which have long been felt and recognized. If it be taken into consideration how much gas is lost in charging and discharging, and the imperfect distillation that necessarily takes place in retorts, owing to the great depth of the material therein under the present system of working, it is not unreasonable to estimate that 15 to 20 per cent. of the available gas from coal is lost to the gas manufacturer.

Ingenious and expensive machinery has been designed and erected for the purpose of mechanically charging and drawing the retorts; but these are acknowledged to be, at the best, but a mitigation and not a removal of the difficulty. Other inventions have been tried with the object of dispensing both with hand labour and mechanical contrivances as at present in operation, and secure a constant and continuous passage of the coal through the retorts. But till very recently, Brunton's horizontal and Scott's vertical retort have been the nearest approach to the continuous feeding and discharging of the retorts by the aid of machinery, and to the realization of the dreams of those who have devoted much thought to the subject of gas manufacture. To the various coal-carbonizing arrangements now in use, another has been added by Messrs. Yeadon and Co., Engineers, of Leeds, who are already well-known in this country and abroad in connection with their patent briquette machinery, for utilizing small coal by converting it into blocks of compressed fuel. They are introducing their (Yeadon and Adgie's patent) revolving gas retorts, of which they have supplied us with the following drawings and description. By the aid of their retort, Messrs. Yeadon claim to have solved the difficulty of securing the advantages above enumerated as having been sought after by former inventors, and which, if realized, cannot fail to effect a complete revolution in the existing methods of gas manufacture. In addition to this, Messrs. Yeadon claim to effect a considerable saving in the price of gas coal; as instead of being obliged to use the largest or medium sizes of coal, by their method of carbonization the smallest (and consequently the cheapest) sizes are the most advantageous.

In the accompanying illustrations, fig. 1 shows a longitudinal section of the retort; fig. 2, the back or discharging end; fig. 3, the side elevation; and fig. 4, the front elevation of the feeding end, with the arrangement of coal elevators and conveyor in combination therewith.

It will be at once seen that this differs from all preceding gas retorts, inasmuch as instead of being fixed and stationary, as in ordinary systems, the retort revolves slowly inside the furnace, and therefore does not require any bed of brickwork upon which to rest. The body of the retort A is made of fire-clay, of a cylindrical conical shape, revolves in the furnace B, and rests at each end in the metal sockets CC¹, to which it is secured by bolts. These sockets are turned on the circumference of the retort, and thus smoothly revolve on, and are supported underneath by, the bearing rollers DD¹ (two at either end), revolving in the metal boxes EE¹ outside the brickwork of the furnace. The retorts are thus suspended, with no brickwork underneath them; and, in revolving, the heat of the furnace comes in direct contact with the whole circumference of the fireclay body.

The interior of the retort has a number of continuous blades running nearly the whole length. The object is three-fold—viz., to work the coal through the retort; to raise it constantly from the bottom of the retort to nearer the top, and then allow it to fall over (thus keeping it loose and open, and accelerating the process of distillation); and also to strengthen the shell of the retort, and make it better able to carry the weight of the coal.

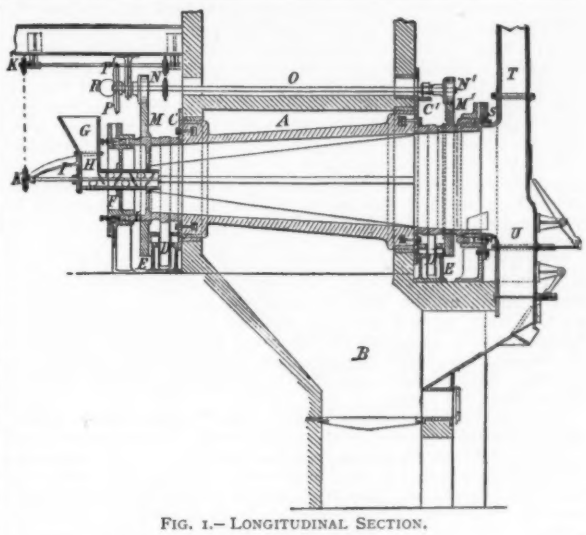


FIG. 1.—LONGITUDINAL SECTION.

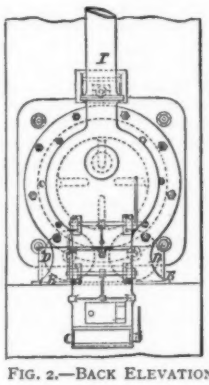


FIG. 2.—BACK ELEVATION.

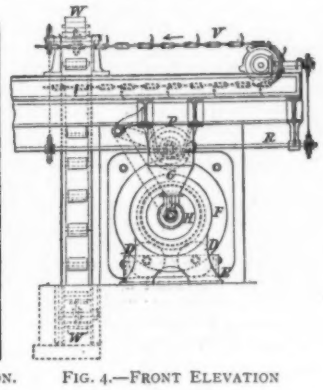


FIG. 4.—FRONT ELEVATION

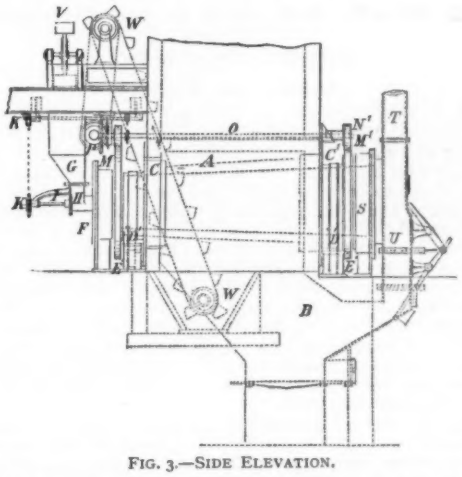


FIG. 3.—SIDE ELEVATION.

These blades are made of a tapering form, deepest at the front or feeding end, where the coal requires to be broken up most, and gradually tapering to nothing; thus preventing the coke being unnecessarily broken after the gases have been liberated. The retorts are made conical in shape, and widest at the discharging end. At either end is a fixed end-plate, with a recess fitted with asbestos or other rings, in which the ends of the retort revolve, whilst a steam chamber at the back of these recesses keeps the packing-rings up to the retort ends, and makes a gas-tight joint, but yet allows for expansion and contraction.

The front end-plate F has a hopper G, into which the coal is fed from the conveyor V, after being delivered there by the elevator W. At the bottom of the hopper is a cylinder H, of smaller diameter than the retort, fitted with an internal shaft I, on which are fixed adjustable blades. The speed of this internal shaft is regulated by the change chain-wheels K K¹. The cylinder being always kept full of coal, any escape or ingress of air is prevented. This cylinder delivers the coal into the interior of the retort, where it falls on to the bottom, and is then caught by the blades shown, which are constantly raising the coal from the bottom to nearer the top of the retort, and then allowing it to fall over, as above described. The annular ring in the interior of the

retort prevents the coal working back into the recess L This constant turning over of the coal promotes rapid distillation; whilst by the conical shape of the retort the coal is gradually worked through to the discharging end. The internal blades gradually taper down to a point where the coal, having been converted into coke, requires little or no breaking up. The back end-plate S, like the front one F, is fitted with grooved recess, packing-rings, and steam chamber. A scraper guides the coke into the discharging outlet-pipe O, which is fitted with two discharging-valves, by means of which and the swing door, the hot coke can be delivered right into the furnace, into a water-cistern, or into an endless conveyor, and transported outside of the retort-house.

The retorts are driven at each end by spur-wheels M M^1, fixed on the metal sockets. This arrangement avoids any torsional strain on the body of the fire-clay retort. The wheels receive their motion from the pinions N N^1, on the shaft O, which again is connected by the bevel-wheels P P^1 to the main driving-shaft R, which can be arranged to drive any member of retorts. T is the ascension-pipe; and there is a small manhole in the back end-plate.

By means of this arrangement, Messrs. Yeadon claim to secure the following important advantages:—(1) The smallest, and consequently the cheapest, coal can be used. (2) All mechanical stoking, or hand labour in stoking, is dispensed with. (3) The coal is regularly and continuously fed into, passed through, and the cinders discharged from the retorts, without any escape of gas. (4) The small size of the coal and its thin stratum, added to its being regularly and constantly turned over and kept open, allow of the distillation being most thoroughly effected, and in a tithe of the time now required in the fixed retorts. (5) No carbon deposits can accumulate at the bottom of the retorts; and the ascension-pipe is at the hottest end—thus preventing choking. The retorts are not subject to the damaging effects resulting from changes of temperature; and the hot discharged coke can be delivered direct into the furnace. (6) The retorts do not require any brickwork bed upon which to rest, and therefore can easily be withdrawn at the back and replaced when worn out, without any brickwork being disturbed; while a more uniform quality of gas can be produced by a more even temperature in the retort being able to be kept up. It is intended to take the manufacture of gas entirely out of the hands of the unskilled stoker, and place it under the control of the skilled engineer; and it would thus render gas companies and engineers altogether independent of those disastrous strikes which have of late been so frequent.

NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

The Twentieth Annual Meeting.

(*Concluded from page 693.*)

Mr. Ralph Woodward, of Waltham (Mass.), contributed a paper entitled "Some Notes taken in a Small Gas-Works." Speaking of leakage, he mentioned a system of 17 miles of mains that was under his care. On this he had 112 street valves—the average distance between each being 800 feet—so arranged that each section could be separately tested. For new mains he recommended that the valves should be about 500 feet apart, and always at street intersections. Each section was tested every year, and a careful record kept. This system, combined with a thorough knowledge of the probable day consumption, enabled him to locate leaks with great precision; and the loss last year was 55,500 cubic feet per mile of main—3½ per cent. on the make. Meters should be regularly tested, and much more frequently than was usual. Of 266 meters tested in his district last year, 159 were correct within 2 per cent., and the average showed 1·7 per cent. slow.

A paper on the "Vaporization and Feed of Oil to Generator and Retort," was read by Mr. W. R. Addicks, of Boston (Mass.). Referring to the importance of heating oil properly, he said that bad apparatus or working in this respect led to trouble from deposition of lampblack and pitch and from condensation in the purifiers, mains, and services. These nuisances might be entirely avoided by feeding the oil under constant pressure—and that as low as possible, by careful attention and adjustment as to quantity supplied, and by avoiding sudden shocks or changes of temperature. Having once been vaporized, it should not be cooled until entirely converted into permanent gas. He described an apparatus for feeding oil under constant pressure, devised by Mr. Flannery, of the Standard Gas Company, New York. Oil-meters, although possibly not quite accurate, should always be used. A liquid admitted under pressure in the form of spray, absorbed a large quantity of heat in the act of expanding, and therefore this plan as applied to the introduction of oil into a retort was a mistake. Referring to the "latent heat" of steam, he concluded that oil in like manner absorbed a large quantity of heat in the act of vaporization, and that the introduction of liquid oil direct into a retort would tend to greatly reduce the temperature. It was preferable to vaporize the oil as a preliminary operation, by exposing it to a gradually increasing temperature. This might be done by passing it through a steam jacket and then through pipes exposed to the waste gases from the furnace, before admitting it to the retort.

A conversational discussion followed the reading of the paper, in the course of which the arguments advanced were generally approved; and it transpired that crude oil was more troublesome to deal with than naphtha. It required a larger surface in the superheater.

"A Point or Two in Regard to Illuminants during Condensation and Purification" formed the subject of a paper by Mr. G. F. Goodno, of Dedham (Mass.). In view of the general opinion that lime in the purifiers absorbed hydrocarbons from the gas, the author tried a number of experiments, passing gas through a layer of oxide, or a layer of lime, each about 12 inches thick, and examining the gas for hydrocarbons by means of Hempel's apparatus, before and after treatment. The result of nine separate experiments was to show that the percentage of absorbable hydrocarbons was not reduced by passing through lime or oxide. The author remarked, however, that a very minute variation in the percentage of hydrocarbons by volume would be sufficient to materially influence the illuminating power. The gas was next examined in a similar manner, as to the effect of the passage through a pipe condenser, and a washer consisting of a rectangular iron box with alternate shelves, supplied with 4 to 5 gallons of fresh water per 1000 cubic feet of gas passed. The average of five experiments gave a loss of hydrocarbons to the extent of 0·36 per cent.

In the course of a discussion on the subject, Mr. Jones said that he had found that crude oil gas made by the bootleg retorts, also known as the Baby process, lost 3 candles or so between the retorts and the station meter, being reduced from 24 to 21 candles. Mr. Humphreys said he made a mixture of oil and water gas, and the result of careful experiments showed that there was no loss of illuminating power or hydrocarbons at any part of the works.

Mr. W. H. Snow, of Holyoake (Mass.), read a paper on "A Chapter of Don'ts." He warned his hearers against unwise economy in the construction of retort benches, insisting on the importance of substantial foundations, and settings of ample size, also of materials and workmanship of the best character. He next spoke strongly in favour of generator furnaces, as compared with the old style. With a bed of six retorts, each 14 by 28 inches by 9 feet long, he could burn off 2000 lbs. of coal per 24 hours per retort, in four-hour charges. This gave a yield of 10,000 cubic feet per retort, and the consumption of fuel was 60 bushels of coke. The fires only required clinkering twice a week; and there was no trouble from stopped pipes. The furnaces were simple recuperative ones, and had been the means of increasing the make per bench 20 per cent., and reducing the fuel consumption from 47 to 33⅓ per cent.

The consideration of the contents of the question box was the next item on the programme. A query as to the effect on the meters of the use of crude oil as an enricher elicited the reply that if the gas was properly fixed, there would be no trouble. An inquiry as to whether a reduction in price to users of gas-stoves had ever been known to cause dissatisfaction to those who did not benefit by the reduction, brought out a variety of opinions, some in favour of differential prices, others against them. After some discussion on other topics, the meeting was brought to a close with the usual votes of thanks.

The Efficiency of Gas-Engines.—A paper on this subject was recently read before the Liverpool Engineering Society by Mr. T. L. Miller, Assoc. M. Inst. C.E. The author referred to the practice of stating the efficiency of gas-engines in terms of the gas consumption per horse power per hour, without any reference to the thermal value of the gas used; and showed, from a comparison of the calorific value of the gas in different districts, how unfair such a practice was when the efficiencies of engines tested in different localities were so compared. An explanation of the various senses in which the term "efficiency" was used in the paper was then given, after which the author explained the system of classification of gas-engines adopted by Mr. D. K. Clark—the theoretical efficiency of the various types being given. The causes of loss in the gas-engine were then referred to in detail; and the means by which such losses might be reduced explained. The experiments of Messrs. Clark and Douglas on the explosion of gaseous mixtures were then touched upon; and the various theories advanced to account for the suppression of heat at the moment of ignition were dealt with. A discussion on the more important tests of gas-engines followed; the absolute amounts of heats supplied to the engines per horse power, together with their efficiency, being given. The Hargreaves motor was then referred to, and its method of working explained; and a comparison was made between the results of tests with this engine and those of the most economical gas-engines mentioned. The author concluded the paper with a comparison of the efficiency of the gas-engine with that of the steam-engine, in the course of which he pointed out that, while the gas-engine has the advantage from a thermo-dynamic point of view, the high price of its fuel soon places it at a disadvantage, as, with coal gas at 3s. per 1000 cubic feet and coal at 15s. per ton, the gas-engine, with a consumption of 20 cubic feet of gas per indicated horse-power per hour, is just equal in cost of fuel to that of a steam-engine indicating 1-horse power per hour for a consumption of 9 lbs. of coal. The discussion on the paper was adjourned.

PRACTICAL HINTS ON PURIFICATION BY LIME.

In a recent issue of the *American Gaslight Journal*, Mr. F. Egner gives a few practical hints on the purification of gas by lime which helped to explain a difficulty experienced by some of his colleagues in America, and may be found serviceable by gas managers in this country. Mr. Egner was applied to by a number of gas men for an explanation of the reason for the quantity of gas purified per bushel of lime used being for a time greatly reduced at their works, without any apparent cause. In each case the statement was made that the same kind of coal that had been employed for years past was used then; and so it was with the lime, and even the men employed who handled the material. Yet the number of cubic feet of gas purified per bushel was all at once reduced to less than half the usual average. The apparatus and method of operation were described; and, so far as could be judged therefrom, everything was as it ought to be. Still the fact remained that where previously perhaps 20,000 cubic feet of gas and upwards were purified for each bushel of 80 lbs. of stone lime used, not more than half this amount could be passed through the boxes before a change would have to be made.

In view of these statements, Mr. Egner was puzzled for a time to account for this state of things, until the same happened at the works of which he had charge. It was in December, some years ago, when he had his first experience of the kind. All at once the purifiers had to be changed more frequently than the increased quantity of gas made warranted; and with each day the matter became worse, until he investigated the case thoroughly, and found the cause. They were using the same kind of coal—even from the same stack—which they had previously carbonized when purifying from 22,000 to 25,000 cubic feet of gas per bushel of unslaked lime. The lime was fully as good as at any time before; and the men who did the work were the same, and were known to be faithful, hard-working men. And while the trouble lasted these men toiled much harder than ever; but for all that Mr. Egner had to employ nearly thrice the force, and certainly had to buy more than double the amount of lime.

Samples of the lime were carefully analyzed, and found very good, before using. The material was examined after it was prepared for the boxes, and found to be apparently just right. The foreman of the purifier-house said he was doing everything as usual; and there was no reason to doubt his statement. But the fact remained that the results became no better, but worse, as the season advanced. At last Mr. Egner resolved to remain in the purifying-house for a time with the men, to see if after all the fault was not there, as nothing could be found wrong elsewhere which could cause the trouble. He did not have to stay long. Within less than half a minute after seeing the men slake the lime, he knew where the trouble was, and applied the remedy at once.

The manner of preparing the lime used to be as follows:—A bed of lime containing about 50 bushels was made on the floor something like bricklayers make their mortar beds. The unslaked lime was spread in a thin layer, about 4 or 5 inches deep, and then nearly the whole quantity of water needed was poured over the lime by means of a large hose and some barrels which had been previously filled. As the lime slaked, it was turned over, by means of long-pronged rakes made for the purpose. After having been well slaked, about one-tenth of its bulk of screened coke breeze was added, and the whole thoroughly mixed and moistened, until if a handful were taken and tightly squeezed it would stick together and show the imprint of the fingers. Thus prepared, he could purify, on an average, upwards of 22,000 cubic feet of gas to the bushel of unslaked stone lime, when using Pittsburgh coal. This was a somewhat tedious process of preparing lime, but he says it paid for the trouble.

As the season advanced, the foreman, hoping to keep up with the increased demand without employing additional labour, made some improvements as he believed in the slaking process. He would spread 100 or more bushels of lime on the floor, in layers 8 to 10 inches deep. Then he would turn the big hose on the lot, and when the top was of about the consistency of stiff mash, he would tell a man to go over the bed with a small hose, at the end of which was a half-inch pipe, and with that prod round the pile—sticking it (with the water turned on) to the bottom at short intervals. Then he would spread the coke breeze as before, and mix it all.

When mixed, the lime appeared to be just the same as when it slaked properly; but it was nothing of the kind. It was more than half destroyed by the process above described. The man could slake treble the quantity of lime with the same amount of labour, but it was misdirected labour—well intended on the part of the foreman, but ruinous as to the results. Within two days after stopping this "improved" method, and insisting on the old plan being continued, Mr. Egner had the old results again, greatly to the foreman's surprise, who could not before see any difference between his new way and the old way of slaking the lime. But the results did not convince him, as they would have done almost anybody who has been similarly troubled; for, a few years afterwards, he repeated his experiment, with the same effect as before. But he was quickly found out.

Mr. Egner had attributed his trouble to wet coal, a defective centre-valve, water gas being made in conjunction with coal gas, furnace gases being drawn in perhaps by running the exhauster too fast—everything he could think of—with the falling off in his purification. But there was the fault—simply the improper slaking of the lime. He gives this experience as showing the need of the frequent personal care of the manager to ensure the best results—like everything else connected with the manufacture and distribution of gas.

Artesian Wells in California.—Artesian wells are being put down in great numbers in the district of Riverside, California; and, owing to them, this district, which was previously almost uninhabited, on account of the scarcity of drinking water, has now a population of 7000. The wells have been made along the bases of the mountains San Bernardino and Gray of the Sierra Nevadas; and in all forty have been sunk up to the present time—the average depth being 130 feet. The outflow of water is stated to be abundant, and at a high pressure.

The Late Johann Georg Halske.—Herr Johann Georg Halske, of Berlin, the co-founder and, for many years, partner of the well-known firm of Siemens and Halske, whose death has been lately recorded, was born at Hamburg on July 30, 1814, and went to Berlin, where he set up an engineer's shop in 1844. Soon after he made the acquaintance of Werner Siemens; and it was in Halske's workshop that Siemens, assisted by the mechanical skill of his colleague, was able to work out his first inventions in telegraphy, so as to bring them before the public. In 1847, the two men entered into partnership, and laid the foundation of the great telegraph construction and electrical apparatus works which are associated with their names. Halske left the firm in 1867, and then became an active member of the Municipality of Berlin. A number of interesting facts concerning the part played by Halske in the foundation of the Siemens business are given in the "Life of Sir W. Siemens," by Dr. Pole, a review of which appeared in the JOURNAL for Nov. 6, 1888 (p. 797).

Gas Enterprise in South America—Under this heading, in the JOURNAL for the 15th inst., we gave an account of the new gas-works which Mr. G. E. Stevenson, M. Inst. C. E., has lately put up at Paraná, and alluded to the progress he is making with those in course of construction for the Co-operative Gas Company of Buenos Ayres. In connection with the indication of the extension of gas enterprise in South America which these examples afford, we may refer to the satisfactory working of the La Plata Gas Company. When this Company was started, it was predicted by many that it would certainly be a failure; grave doubts being entertained as to whether any gas undertakings in provincial towns of South America could be made to pay. This Company is, however, a proof that the contrary is the fact; for, although they have no public lighting (this being done by electricity), the profits resulting from last year's working amount to 12½ per cent. on the capital sunk, which is something like 50 per cent. in excess of the actual cost of the installation; a large extent of land having been purchased, the cost of which added considerably to the capital required. We learn that the increase in the consumption of gas last year was so encouraging, that the Directors are contemplating extending the works and mains, and have decided to raise more capital for the purpose.

The Abatement of Smoke.—In the course of a letter on this subject, recently addressed to *The Times* by Mr. A. E. Fletcher, the Chief Inspector under the Alkali, &c., Works Regulation Act, he stated that a Committee had been formed, of which he is the Chairman, and Mr. F. Scott, of Manchester, the Secretary, to examine into and report on the whole question in order to assist coal consumers in their efforts to prevent the emission of smoke, and possibly to stimulate the invention of new methods of regulating the combustion of coal. The Committee is supported by scientific men and manufacturers throughout the country, whose intention is, by a rigid examination of the principal appliances offered for preventing the emission of black smoke, to issue such a report as shall show which, if any, of them can be recommended to supersede careful hand-firing for the object in view. Their work will embrace the collecting of information respecting the efficiency and general value to the coal consumer of smoke-preventing appliances or methods by the following means:—(1) Collation of the results of past experience. (2) Examinations or tests to be conducted by experts, appointed by the Committee, at places where the appliances for, or methods of, consuming coal smokelessly are already at work, with the object of ascertaining whether, under ordinary working conditions, these methods or appliances produce or are accompanied by practical freedom from smoke, reasonable amount of duty, economy of fuel, moderate cost in wear and tear and simplicity of construction, and moderate cost of application. (3) Examinations or tests, to be conducted on premises temporarily occupied and furnished with boilers, chimneys, and apparatus, of such appliances or methods as cannot be adequately tested where they are in use, and which are of sufficiently promising and distinct a character. (4) The issue of a report embodying the results of the Committee's operations.

REGISTER OF PATENTS.

Lamp-Posts or Standards.—Hawkyard, J., and Braddock, J., of Oldham. No. 7750; May 9, 1889. [6d.]

This invention consists in the employment of a combination of two or more metallic tubes, placed on end in juxtaposition, and secured together by perforated plates or binders.

The plate to which the lower ends of the tubes are secured is large enough to act as a foundation or base plate; or when used as in ordinary street lighting an enlarged plate or binder may be used at the floor level, partially sunk in the earth or pavement, so as to increase the stability of the post. The plate or binder securing the upper ends of the tubes is made to carry or support a chair or other frame adapted to receive any form of lamp or lantern. Some of the advantages claimed for this lamp-post are as follows:—That it admits of great variety of ornamental design. That one or more of the tubes may be used for the gas supply, while the others contain electric conducting wires. That it does not require a ladder arm; and, being flat sided, a ladder will rest steadily against it. That owing to the lightness of its parts, it offers great facilities for transport. That by the use of wrought iron, steel, or other malleable tubes, it may be made malleable or tough, and consequently will not be liable to fracture. In the event of damage any part can be cheaply replaced.

Apparatus for Water Gas.—Rose, G., Baird, A., and Baird, M. B., of Glasgow. No. 7812; May 10, 1889. [8d.]

This invention, relating to the manufacture of water gas, has for its object to improve and simplify the present method and apparatus.

Under one arrangement, the patentees construct a brick-lined furnace, in the centre of which is fitted a cast-iron gas producer or retort, containing shelves on which carbon (preferably coke or char) mixed with iron scrap or nails is placed. The furnace is preferably heated by a liquid-fuel flame from a lamp or burner; the lamp preferred to be used being one wherein water is converted into steam in a coil, pipe, or boiler heated by the flame of the lamp, such as that described in patent No. 11,517 of 1888. The flame of the lamp is led through an opening in the side of the furnace, and fills or partially fills the annular space left between the retort and the furnace walls; and by thus confining the liquid-fuel flame, an intense heat is raised in a short time in the furnace. The water to be converted into water gas is conducted to a small cistern, which automatically supplies itself with water by means of a ball cock or float valve arrangement fitted in it. The water from the cistern is led by piping to, by preference, a steam generating coil pipe, although a small boiler may be used, which is either placed in the funnel or flue of the furnace, or else in the furnace itself. The superheated steam as generated is led by a pipe connection, having cut-off and drip cocks on it, through the furnace walls into the retort, and is there converted into gas.

The heated gases from the retort pass to a cooling and cleansing apparatus, which consists of a number of iron pipes either brick-lined or fitted with fire-clay. The gases are led into the lower end of the first of the pipes, ascending which they pass down the next, up the next one, and so on alternately up one and down another. There may be arranged at the top of each of the pipes a water-jet nozzle or rose preferably fitted in a single box extending along the top of the pipes, or in a series of boxes fitted together. The nozzles emit a constant spray of water down each pipe; and thus cool and clarify the heated gases from the retort. At the lower end of the cooling apparatus, a water trough (for the collection of the water passing down the pipes), divided into compartments, is provided. The pipes of the cooler may be filled with stones, broken fire-brick, scrap iron, or any other material to aid in the cleansing of the gases. From the cleansing and cooling apparatus, the gas is led either away to the place where it is to be burned or collected in a holder.

Gas-Regulator.—Taylor, J., of Nottingham. No. 7889; May 11, 1889. [8d.]

This invention relates to regulators for gas-engines, so as to maintain one uniform pressure therein, and to automatically control the supply of gas thereto.

For this purpose, the patentee proposes to employ a cylindrical or other shaped dish casting, having a suitable inlet branch or opening, and an outlet branch in the circumference. The open side of the dished casting is completely covered with a thin india-rubber diaphragm, which is capable of being distended, and secured to the casting by any suitable means, so as to form a gas-tight joint with the cylindrical casting. The inlet branch—formed in the upper side of the casting—is bored out to form a seating for, and is fitted with, a valve, capable of being raised from its seating by the short cam-shaped end of a double-ended lever, working underneath the valve in a joint or fulcrum from the dished casting. The opposite longer end of the lever is attached to the diaphragm.

The action of the lever is such that, when the diaphragm is not distended, the lever is in a perpendicular position. The full part of the cam end raises the regulating-valve wide open, to admit gas thereby into the gas regulator or bag; and when the quantity and pressure of gas in the regulator is such that the diaphragm is distended, it carries with it the long end of the lever, moving it out of the perpendicular. This carries the full part of the cam away from the valve—either to allow it to come down to its seating, and cut off the supply of the incoming gas to the regulator, or to so automatically control the supply of gas thereto as to maintain a quantity of gas at a uniform pressure therein, according as the gas is withdrawn therefrom by the outlet branch in varying or constant quantities. The extent to which the diaphragm is distended and the lever carried out of the perpendicular, directly controls the extent to which the admission-valve is opened.

Compounds to be Used for Manufacturing Illuminating Gas, the Prevention of Stoppages in Ascension-Pipes, and the Deposition of Naphthalene.—Darwin, S. B., of Portsea. No. 8263; May 17, 1889. [4d.]

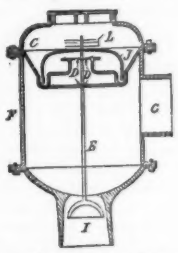
The objects of this invention (according to the patentee) "are to utilize coal tar and breeze, together with shale, petroleum, or paraffin oil, or coal or cannel tar oil, or other suitable oil, and with or without the addition of slaked or hydrate of lime, for preventing stoppages in ascension-pipes, and the deposit of naphthalene, while the gas produced by the use of this mixture in addition to coal is of superior quality."

For the purpose of carrying out the invention, the inventor proposes to mix together (by a pug mill or other appropriate means) 160 gallons of tar, 28 gallons of oil, 96 bushels of breeze, and in some cases about 10 bushels of slaked or hydrate of lime—or other suitable proportions according to the particular kind of coal employed, and other circumstances. The mixture should be in most cases sufficiently solid, and so mixed together, as to keep from running or firing when heaped on the retort-house floor, and to bear walking upon without inconvenience, or subject to be set on fire by hot rakes, or other implements. When the retort is charged with coal, an ordinary scoop full of this compound is to be introduced into the retort and left on the top of the coal; both the coal and the mixture being carbonized together. As an alternative, the retort may be opened (say) an hour before the allotted time fixed for drawing the coke; and instead of recharging it with coal, a scoop full of the mixture may be laid on the top of the red-hot coke, and the whole left until the right time for drawing the charge. When adopting the latter course, it is preferable to select the hottest retorts for introducing the mixture; the coal in such retorts being usually carbonized somewhat earlier than the full time allowed for the operation in retorts charged with coal alone.

By these means gas of a superior quality is said to be produced; the water used in damping the breeze, in addition to that already existing in it as moisture, being converted into steam and subsequently into hydrogen. The hydrogen mixed with the rich permanent gases derived from the tar and oil also mix with those eliminated from the coal and other sources; these compound gases, mixed with the gases manufactured in the ordinary way, while increasing the illuminating power of the whole, also prevent the deposit of naphthalene and the choking of the ascension-pipes.

Gas-Regulators.—Clamp, C. J., of Hull. No. 18,563; Nov. 20, 1889. [6d.]

A gas-regulator constructed according to this invention is composed of a dome, at the top of which is a screw cap having a hole in the centre to permit of the air entering and escaping; thus allowing the inverted cup or bell to rise and fall freely. The air-hole, however, is so constructed as to prevent the escape of the mercury even if the



machine were overturned. The portion C is a lute specially prepared to prevent any action of the mercury upon the metal by being coated with enamel; the centre portion being raised and returned, so as to prevent the escape of the mercury down the centre hole of the lute, across which are guides D (indicated by the arrows) with holes in them large enough for the passage of the valve-rod E. The portion F is cylindrical shaped, and attached to it is the outlet nozzle G. The bottom portion also forms the inlet nozzle I, which, like the outlet, is so formed as to admit of any water passing freely through the machine, and thence into the meter or other receptacle. There is also an inverted cup or bell dipping into an annular trough filled with mercury; and the valve is connected to the cup or bell by the valve-rod E. The machine is regulated by weights L placed over the spindle, and resting upon the top of the inverted cup or bell. The different portions forming the casing of the machine are screwed together, and made gas-tight with washers, or in some other suitable manner.

Automatic Safety Gas-Burners.—Garland, N. M., of New York. No. 20,736; Dec. 24, 1889. [6d.]

This invention relates to apparatus intended to prevent the flow of gas to a gas-burner when the flame is extinguished by accident or design, or when the ordinary valve is opened and the gas not ignited.

Within the base of the burner is mounted a valve, of which the bearing surface or face is rounded after the manner of a ball-valve, and which is as large as convenient, so that a slight displacement will open a gas-way of ample extent to serve the burner. The stem of this valve passes through a bridge provided for it, and is made hollow with its lower end closed. The bottom of the cup or well thus formed is utilized as the bearing for the lower end of an expanding rod, by which the valve is automatically moved; and it thus brings the bearing point well below the face of the valve, so that it may be moved from its seat evenly all round or without canting. The valve seat formed in the base part (or mounted therein) is made sharp, so as to form a knife edge seat, against which the valve will effectually close. A light spring holds the valve nominally seated. The expanding rod bears upon the tip of the burner at one end, and upon the bottom of the valve stem at the other; and when cold, it is long enough to leave the spring free to seat the valve. This rod is preferably made of aluminium; and a portion of it may project through the burner tip.

When a light is applied over the burner, it heats the rod, which, expanding, opens the valve a trifle; and thus allows a small quantity of gas to escape and be ignited. This further heats and expands the rod, allowing more gas to pass; and thus the flame increases until of the required size. The lighting needs but a very few seconds; but in cases where it may not be desirable to wait for the flame of the match to heat the rod, a key is used to connect the valve stem, by turning which the valve may be unseated so as to allow a quantity of gas to escape immediately. As soon as the key is released, a spring returns

the key; and if the gas is lighted, the expanded rod will prevent the valve from seating completely, but if not it will be seated, and the flow of gas arrested. The key is prevented from being turned so far as to sustain the valve in open position by means of a stop. Between the tip and the shell of the burner, insulating packing is employed, which confines the heat from the flame or match to the region of the upper part of the expanding rod, and renders the device more sensitive than it might otherwise be.

Gas-Burners.—Lake, H. H.; communicated from W. F. Folmer and W. E. Schwing, of New York. No. 698; Jan. 14, 1890. [8d.]

This invention, relating to gas-burners, consists in the combination of a body and a plug, both having two sets of main supply ports—one behind the other in the direction of the axis of the plug. It consists further in the combination with the parts named, of a screw working in a tapped hole extending axially in one end of the plug and beyond one pair or set of ports and reaching to the other pair or set, so that it may wholly obstruct one pair or set and partially obstruct the other pair or set, so as to regulate the flow of gas.

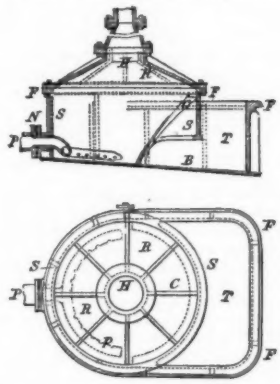
Another improvement consists in the combination of a burner body, a rotary plug fitted therein, a ratchet wheel mounted on the plug, a lever having a pawl engagement with the ratchet wheel, a screw engaging with the plug and having a head bearing on the outer side of the ratchet wheel, and a spring acting to hold the ratchet wheel against the head of the screw. This forms a very simple way of holding the ratchet wheel in position. Preferably the lever is provided with a central hole to fit around the ratchet wheel, and held against the head of the screw by means of the spring. When the lever is so made, it will have a notch or offset from its central opening, and in this the pawl will be located.

Another improvement consists in the combination with a lever and pawl, such as last described, of a lateral projection from the pawl and a volute spring, serving to move the lever in one direction, and also to hold the pawl in engagement with the ratchet.

A still further improvement consists in the combination of a burner body, a rotary plug having a diametrically extending port, a ratchet wheel mounted on the plug and having four teeth, a pawl, a lever carrying the pawl, and having a swing of about one-quarter of a circle, so as to alternately move the port of the plug first to open and then to close it.

Saturators for Sulphate Plant.—Kennedy, G., of East Ham, Essex. No. 1653; Jan. 30, 1890. [6d.]

The objects of this invention are to remedy certain objections to sulphate saturators as at present constructed, to lengthen their duration, and to obviate as far as possible the necessity for repairs. These objects are attained by casting in two or more parts the whole saturator of a solid metal or alloy adapted to withstand the action of the acids or agents employed; by also adopting a construction by which all surfaces are strengthened, and by a special method of making the joints of all pipe connections. The metal used for casting is lead alloyed with a small percentage of antimony, if desired, to harden it; its thickness depending upon the size of the apparatus required.

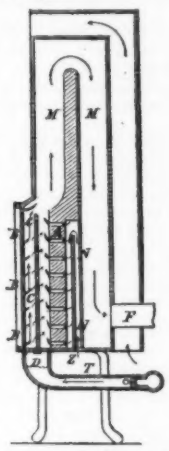


The saturator illustrated is cast in two parts only. For convenience of transit, however, this may be varied; but it is advantageous to have as few sections as possible. The body S is cast in a mould in one with the bottom plate B and the walls forming the front trough T; the bottom being inclined towards the trough in the usual manner for facilitating the removal of deposited salts. The cover R is cast in one other piece. An opening is left in the bottom part of the front wall of the body; the upper part forming the curtain C. The patentee proposes to cast solid with the curtain and side walls an arched rib; and a similar one (not shown in the drawing) may be cast outside. To support the surfaces, the base plate is extended beyond the walls, and flanges F are cast upon and along the full length of the top rim, with upright stiffening ribs between. The cover R is cast either coned or domed, with a flange or rim fitting the top flange F of the body to which it is bolted; and a flanged aperture H is provided at the apex—also with stiffening ribs. The usual sulphuretted hydrogen pipe is made tapered, and bolted to the flange of the aperture H, and to a joint at any convenient height on the pipe above it, so that by removing it the aperture serves as a man-hole when required. The ammonia pipe is at the back, and is fitted with an internal perforated lead distributing pipe; while the acid supply pipe can be fixed in any convenient part.

In order to make tight joints for these pipes, flanged necks such as N, are cast on and with the body S, and to the flange N asbestos or other packing is applied; while over it the end of the lead pipes is expanded. Upon this fits the flange of the external pipe P; and the two flanges are afterwards securely bolted together. Thus the joints can easily be broken when required and re-made.

Gas-Stoves.—Clamond, C., of Paris. No. 2551; Feb. 17, 1890. [6d.]

This is a stove designed to utilize the radiation of bodies heated red hot by the combustion of gas.



As shown in the engraving—a vertical section of the apparatus—the stove consists of a thin refractory plate C, with holes for the passage of flame through it (or it may be a grating), with another similar plate B, usually of metal that does not readily melt—such as iron, nickel, or alloys thereof—standing parallel to it. A thick wall A of refractory material which is a bad conductor of heat, pierced with holes, stands parallel to B and C; while a chamber D under these plates is supplied with a mixture of air and gas by a Bunsen tube T. The cover of D is perforated by holes, through which the mixture of air and gas passes to the space between B and C. The combustible mixture between the plates burns only where the holes admit air to it—producing flames directed towards the plate C, and heating its front surface. Unburnt portions of the gaseous mixture flow through the holes; and, being supplied with heated air passing through the holes, these portions burn and heat the back of C. This plate thus heated on both sides radiates part of its heat on B, which, being also heated by the flames behind it, becomes red hot, and radiates its heat around. The plate B serves also to moderate the radiation from C, which unless it were thus screened would become more or less cooled by the excess of air entering, and cool also the products of combustion. Through the holes are seen bright parts of C standing out as it were on the cherry-red ground of B. This (says the patentee) is pleasant to the eye, and gives the sensation of a bright open fire. The effect can be changed by varying the form and arrangement of the holes, which may be round, rectangular, or horizontal, or vertical slots, or combinations of these. The plate C radiates also on the wall A, which, being thick and a bad conductor, takes up little heat; but the heat is given to the air which passes through A, after entering at Z and passing up heated on its way by the walls N and A. The products of combustion flow, by the flues M, to the chimney F; and these flues, being enclosed in a casing H, heat the air entering the casing, from which it may be led to suitable outlets for warm air.

APPLICATIONS FOR LETTERS PATENT.

5078.—Hunt, C., "Improvements in inclined gas-retorts, and in apparatus for charging the same." April 1.

5115.—Cripps, F. S., "A new form of section of rolled iron or steel, which he calls a 'Channel-Tee.'" April 1.

5163.—Woodhouse, S. J., "Improvements in the mode and means employed for charging and discharging retorts used in the manufacture of gas." April 3.

5192.—Melhuish, A. G., "Improvements in gas and petroleum motors." April 3.

5194.—Waller, G., "Improvements in apparatus for cooling and conveying coke discharged from gas-retorts into suitable receptacles or places." April 3.

5205.—Wilton, T., "Improvements in saturators used in the manufacture of sulphate of ammonia." April 3.

5239.—Blum, J., "The instantaneous production of water gas." April 5.

5243.—Fourness, H., "Improvements in apparatus for carburetting water gas." April 5.

5248.—Priestly, G. F., "An improved construction of valve applicable to gas-engines." April 5.

5273.—Otto, N. A., "Improvements in gas or oil motor engines." April 5.

5275.—Otto, N. A., "An improvement in petroleum or oil motor engines." April 5.

5293.—Welch, W., "Improvements in burners for the use of gas and other inflammable vapours." April 8.

5297.—Burns, W., "Preventing waste of water where gravity supply is used." April 8.

5322.—Allison, H. J., "Gas and oil burner." A communication from F. R. Fennessy. April 8.

5372.—Mitchell, R., and Lawson, C., "Improvements in gas-meters." April 8.

5405.—Robbins, J., "Improvements in water and other pipes and conduits." April 9.

5430.—Williams, H., "Improvements in gas motor and similar engines." April 10.

5432.—Williams, H., "An improved governor for gas motor and similar engines." April 10.

5433.—Williams, H., "Improvements in governing mechanism for the admission valves of gas motor and similar engines." April 10.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

The Avery Gas Process.

SIR,—In common with many other persons, I am surprised not to see any mention, in the accounts of Mr. Trewby's visits to New York for the study of water and oil gas, of the Avery gas system, though it is understood he took out introductions to the President of the Avery Gas Company there.

I find, in his report published in the JOURNAL on the 7th of January last, he says: "There is a process called the Meeze, which has been experimentally tried in New York with very favourable results for a period of fourteen months, and is now about to be tried by The Gaslight and Coke Company at one of their works." This Mr. Meeze, so long ago as Aug. 6, 1886, gave the following certificate as to the Avery gas process:—

During the past month we have at various times checked the results obtained from the Avery gas-producing apparatus now working at Messrs. R. and C. Goldthorp's, at Cleckheaton. (1) The gas is a perfectly fixed gas of high candle power. (2) It is absolutely free from sulphur and ammonia. (3) It stands dilution with air to a remarkable degree, and when ordinary gas-burners are employed with great advantage. (4) The yield of gas per gallon of oil varies with the kind of oil and the extent to which the gas is diluted with air. According to our determinations (which were made by direct measurement after the gas had been mixed with air, passed through a condenser, and travelled through 150 yards of main to the holder), the average yield was 300 feet per gallon.

(Signed) G. H. NIVEN. ARTHUR G. MEEZE.

The Gaslight and Coke Company have been in possession of this certificate upwards of two years. Mr. Meeze could make the apparatus work successfully. Surely Mr. Trewby and his able staff of coadjutors at Beckton cannot have failed. I know they have not.

G. D.

April 23, 1890.

Electricity an Adjunct to Gas-Works.

SIR,—It is not surprising that gas engineers should regard the competition of electric light companies with considerable indifference, for not only do dynamo machines and steam-engines, with their numerous accessories, constitute a much more expensive plant than retorts and gasholders, but above all they do not produce any residuals, whereas it is from the sale of residual products that gas companies derive their high dividends. The Gaslight and Coke Company provide for an annual dividend of 13 per cent. on the whole of their £5,500,000 of ordinary share capital by means of the sale of their coke, ammoniacal liquor, tar, &c. Again, to convert a ton of coal into 10,000 cubic feet of gas, giving the light of 30,000 candles for one hour, is a very simple matter; but if that light has to be mechanically produced by the revolution several thousand times a minute of a dynamo, it necessitates a steam-engine of 150-horse power, and all which that involves in wear and tear, &c. Hence it seems logical to affirm that, as regards the great consuming public, electricity so produced can never become a rival to gas, although those who can afford to pay for it as a luxury are pretty sure to adopt it. Suppose, however, that the electric current could be produced by other means more nearly resembling the manufacture of gas, involving less labour, cheaply and noiselessly, using ingredients which, after they have merely undergone certain changes of composition, whereby they have given rise to a flow of electricity, can subsequently be applied to other purposes for which they are now largely used, and suppose that in this way the residues can, at small cost, be converted into valuable commercial products for which there is a very large demand—then the conditions of comparison with gas would be entirely altered; for not only could electricity be produced as cheaply as gas, but if supplied as an adjunct to gas from existing gas-works, it could be distributed alongside the mains, and attended to more economically than it will be possible for the newly-established electric light and power companies to supply it. Their customers are more widely separated than gas consumers, and frequently only two or three houses in a street or square have hitherto shown a disposition to incur the heavy expense, first of introducing, and next of using electric lamps; while it is very easy to convey insulated electric wires through disused gas-pipes.

I have devoted a very great deal of consideration to the subject of chemically-produced electricity, and have experimented largely and for long periods with a battery which is not a mere toy, such as those required for telegraphic purposes, or which may be seen in laboratories, but one which is capable, with only a few of my "multiple" cells, of lighting more lamps than the 400,000-battery cells with which the telegraphic service of this country with the whole world is performed by the General Post Office; and the following are some of the results which I can guarantee;—

1. A properly-constructed battery will provide an absolutely safe, steady, and constant current for any required length of time.
2. Once charged, it requires very little, if any, attention for hours together, and is, without assistance, capable of automatically adjusting the quantity and pressure of current to the lamps that are lighted, whatever variations may occur in their number. The larger the battery is, the better can this be effected.
3. Properly handled, a chemical battery will occasion no fumes, or unpleasant smell; and, under the same conditions, the oxidation of one ton of zinc (none of which is "consumed" or lost) will produce 1340 electrical horse-power-hours of current; giving in glow lamps the light of 333,000 candles, and in arc lights 1,665,000 candles, which last is 55 times as much light as can be produced from one ton of coal, or 10,000 cubic feet of gas, when burnt in the best new burners.
4. The mechanical details of arrangement, upon which the convenience and simplicity of manipulation depend, are of great importance, but have usually been insufficiently attended to.
5. All the zinc treated in a battery can be recovered by a very inexpensive process, and used over and over again.
6. All the residual acids can be converted into commercial products of ready sale in all parts of the country.

This last, which is of prime importance, and, as regards the cost of electricity, quite turns the balance against dynamical in favour of chemical production, I have only quite recently discovered, by combining the spent acids with the residuals of gas-works—coke and liquid ammonia—to which the admixture gives enhanced value. The acid I use in my battery contain nitrogen and chlorine, and render phosphates of lime soluble. Of these products I venture to send you some small samples. The white powder is rich in soluble phosphate, and richer in ammonia than the richest Peruvian guano (as shown by the accompanying analysis), and worth a very high price to the farmers.

15, *Relf Road, East Dulwich, April* 22, 1890.

O. C. D. ROSS, M. Inst. C.E., Life Member of the Royal Agricultural Society of England.

[ENCLOSURE.]

Advertised Prices of Peruvian Guano, with Guaranteed Analyses.

[From the *Mark Lane Express*, April 7, 1890.]

	Ammonia per Cent.	Phosphate per Cent.	Potash per Cent.	Price *ex* Warehouse London.
Peruvian guano, equal 1	8·9	30·35	2·3	£10 10 0
Do. dissolved	7·8	20 soluble, 4 insol.	2·3	10 10 0
Peruvian guano, specially dissolved, part guano	7·8	20 soluble, 4 insol.	2·3	9 10 0
Raw Ichaboe guano	10 to 11	20 to 22	2 to 3	11 10 0
A. & P. do. do. No. 2	9	18 soluble, 3 insol.	3	9 15 0

Samples of Battery Residuals.

	Ammonia per Cent.	Phosphate per Cent.	Estimated Value based on the Analysis.
White powder	15·72	20·6 soluble	£17 0 0
Black do. (containing 33 per cent. of coke)	10·06	13·2 „	9 0 0

Accidents from Oil-Lamps.

SIR,—Accidents from oil-lamps are of almost, or quite, daily occurrence. Would it not be possible to collect brief accounts of all these, with references for authentication, and from time to time publish them in four-page leaflets? The press agencies would undertake the work of the collection of paragraphs without any heavy expense. When published every gas company could take and distribute a number of hundreds or thousands of these leaflets, according to the size of their respective districts. I believe the result would be to give a great impetus to the use of gas in place of oil, especially where complete facilities, as in my own case, are given to the public to induce them to become consumers.

A. W. MARKS, Secretary, Sheppy Gas Company.

Sheerness-on-Sea, April 22, 1890.

[As a commencement to a list such as that referred to by our correspondent, we give the following paragraph, which appeared in the *Standard* last Tuesday:—"The upsetting of a paraffin lamp last night set fire to the residence of Count H. Lutzow, Second Secretary of the Austro-Hungarian Embassy, in Bruton Street, Berkeley Square. The fire brigade was soon in attendance; but the whole of the drawing-room floor was burned out; and several works of art and some valuable old tapestry were destroyed."—ED. J. G. L.]

The Dangers of Gas and Geyser Baths.—Referring to the article on this subject, which appeared in the JOURNAL last week, a correspondent says he is informed that the heater which caused the accident alluded to in the recent correspondence in *The Times*, was fixed without a flue by the maker, and not by the gas company as stated. He considers the maker of the heater to be directly responsible for the death. With regard to legislation, he thinks, if any is needed, "the first step would be to arrest the maker of the apparatus on a charge of manslaughter, and get the opinion of a jury on the matter. It would bring some makers of bath heaters to their senses, and teach them not to play with lives as they do at present."

The Electrical Signalling Apparatus at the Penmaenmawr Gas-Works.—Mr. Thomas Holgate, Engineer and Manager of the Halifax Corporation Gas-Works, writes to point out that the electrical signalling apparatus fitted up at the Penmaenmawr Gas-Works, described in the JOURNAL last week, was not devised by Mr. R. Dempster, the proprietor of those works; the first apparatus of the kind having been made for, and fixed at, the Halifax works. Mr. Holgate says: "Having special difficulties to overcome in the exhausting of our gas, I conceived the idea of communicating to the engineman a knowledge of every variation of pressure or vacuum (at the foul main near its connection with the hydraulic main) by means of an electric current. My ideas thereupon were submitted to Mr. Emmott, of the firm of Messrs. Blakey, Emmott, and Co., Limited, electricians, of Halifax, with a request that he should work out the electrical details. This Mr. Emmott has performed in a most satisfactory manner; and after a few alterations of a minor character dictated by the trial of the first instrument, we have now obtained a thoroughly reliable means of attaining our object. I refrain from stating the chain of communication by which Mr. R. Dempster obtained knowledge of our experiments at the Halifax Gas-Works, so that he may have the opportunity of disclaiming any credit to himself for the invention of the electrical signalling apparatus." In reference to the last sentence in our correspondent's letter, we may call his attention to the fact that, in the article in the JOURNAL to which he refers, it was not stated that Mr. Dempster claimed to have devised the apparatus in question. What was said was that an apparatus had been "devised and put in operation at the works of Mr. R. Dempster," not "devised *by*, and put in operation."

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Monday, April 21.

The Glasgow Boundaries Bill was referred to a Select Committee, consisting of Lord Romilly (Chairman), Lord Sudeley, Lord Ashburton, Lord Wolverton, and Viscount Sidmouth; to meet on Thursday, April 24.

During the past week the following progress was made:—

Bills read the first time: Derby Corporation Bill; Gravesend and Milton Gas Bill.

Bills read a second time, and committed: Canterbury Gas and Water Bill; Derby Gas Bill; Hartlepool Gas and Water Bill; Luton Gas Bill; Thames Valley Drainage Bill.

Bill committed: Plymouth Corporation Bill.

Bills reported: Bradford Corporation Water Bill; Clayton, Allerton, and Thornton Gas Bill.

HOUSE OF COMMONS.

Monday, April 21.

The Portsmouth Water Bill—to extend the time for the construction of certain works authorized by the Borough of Portsmouth Water-Works Acts, 1883—was ordered to be brought in by Sir F. Fitz Wygram, Sir W. Crossman, and Sir S. Wilson.

DEATHS FROM ELECTRIC CURRENTS.

Mr. JAMES asked the President of the Board of Trade whether any information had been received as to the number of deaths in recent years from electric currents from wires, overhead or otherwise, in the United States; and whether there would be any objection to laying this information before Parliament.

Sir M. HICKS-BEACH said the Board of Trade had not received any official information on the subject. He was, however, endeavouring to obtain some, and when he received any he would be happy to lay it upon the table of the House.

During the past week the following progress was made:—

Bills read the first time: Falmouth Gas Bill; Portsmouth Water Bill; Ystrad Gas and Water Bill.

Bills read a second time, and committed: Leicester Corporation Water Bill; Morley Corporation Water Bill.

Bills reported: Birkenhead Corporation Bill; Whitehaven Gas Bill.

Bill read the third time, and passed: Gravesend and Milton Gas Bill.

Electric Lighting for Plymouth.—The Plymouth Borough County Council at a recent special meeting gave formal consent to the application of the Devon and Cornwall Electric Supply Company for a Provisional Order to enable them to supply electricity within the borough. Asked whether there was a possibility of the Company commencing operations soon, the Town Clerk replied: "Directly they have got their capital." This answer, it is reported, was succeeded by laughter on the part of the members, which seems to imply that they have doubts as to the Company ever obtaining the wherewithal to commence work.

The Scarborough Corporation and Electric Lighting.—From the minutes submitted by the Electric Lighting Sub-Committee at the last monthly meeting of the Scarborough Town Council, it was seen that a letter had been received from the Board of Trade, requesting to be informed as to what movement had been made by the Corporation to give effect to the powers contained in their Provisional Order, or if no steps had yet been taken, to be furnished with some further assurance as to the time within which the Corporation were prepared to commence the supply of electricity under the Order. The Sub-Committee had resolved that the Board of Trade should be informed that the Corporation were prepared to undertake to put into force the powers contained in their Order within a period of twelve months. The minutes were approved.

The Electric Lighting Project for Paddington.—At the meeting of the Paddington Vestry last Tuesday, the electric lighting question was again under discussion. The revised report of the Electric Lighting Committee was presented; whereupon Colonel Barchard proposed the following resolution:—"That, as the Metropolitan Electric Supply Company's terms are the most favourable, and the Company works both the high and low pressure systems, and bearing in mind that it has practically accepted the Provisional Order as amended, as well as the condition to deposit £20,000, and, moreover, has not solicited the Board of Trade to act independently, the Vestry do discontinue its opposition in respect of that Company; and that the resolution of the 18th of February, 1890, be varied accordingly." Mr. Mark H. Judge proposed an amendment to the effect that at this period of the session it would be unwise of the Vestry to commit itself to any particular company or companies at present, and appointing a Special Committee to report in time for the Vestry to proceed with the matter for the session of 1891. A long discussion ensued; and Mr. Judge's amendment received 18 votes, but was lost, and the resolution declared to be carried—14 voting for, and 10 against it. Mr. Judge then handed in a protest against the decision of the Vestry; the protest pointing out that, on Feb. 18 last, the Vestry, when 47 members were present, passed a resolution instructing their Solicitor "to oppose all applications for Provisional Orders;" that the Metropolis Local Management Act, 1855, section 57, provided that, under the circumstances stated, "no resolution or other act of any Vestry shall be revoked or altered at any subsequent meeting, unless such revocation or alteration shall be determined upon by a majority consisting of two-thirds of the members present at such subsequent meeting; and that the number of members present when the division on Colonel Barchard's motion was taken was 27. The above and other facts have been embodied in a letter which Mr. Judge has sent to the President of the Board of Trade.

MISCELLANEOUS NEWS.

PRESENTATION TO MR. A. WILSON, OF NINE ELMS.

On Thursday last, the officers and employees of the Nine Elms station of The Gaslight and Coke Company presented Mr. Alexander Wilson with a testimonial of their esteem and regard, on the occasion of his resignation to take the appointment of Engineer at the Dawsholm works of the Glasgow Corporation. The ceremony took place in the recreation-room attached to the station; and the meeting was well attended by the men—all branches being fully represented. Mr. John Methven, the Resident Engineer, presided, and made the presentation, which consisted of a handsome gold watch and chain, with pendant; the watch bearing a suitable inscription. The Chairman, in the course of his remarks, tendered to Mr. Wilson his congratulations on his new appointment, and expressed feelings of regret at parting with a most zealous officer and valuable assistant. The meeting was addressed by Mr. F. T. Ennis, Mr. Wilson's successor, other officers of the Company, and by several of the foremen and men employed at the works, all of whom spoke with heartfelt expressions of regret at the severance of association with Mr. Wilson, and joined in heartily wishing him full enjoyment in his new sphere of operations, and the same co-operation with his new associates as he had received at Nine Elms. The meeting, which was of the most cordial character throughout, was brought to a close by hearty cheering for Mr. and Mrs. Wilson and their family; thus corroborating in a practical manner the individual sentiments of the whole assembly, as expressed by the various speakers.

PROJECTED COMPETING GAS UNDERTAKINGS IN THE UNITED STATES.

The Gas Supply of Providence and Pawtucket (R.I.).

In the JOURNAL last week (p. 742) we recorded the circumstances under which a Senate Committee of the Rhode Island State Legislature have been investigating the proposals contained in a Bill submitted to the House of Representatives by Mr. J. E. Addicks and others, whereby they sought power to start gas undertakings in the towns of Providence and Pawtucket, in the above-named State, in competition with the existing companies. The proceedings of the Committee on the first day of the hearing were summarized last week; and we now give a report of what took place on the second day (the 10th inst.), when the inquiry was adjourned till the following Thursday.

The first speaker was Mr. F. W. Miner. He explained that an Act of Incorporation only differing in two points from the Bill before the Committee, and including the cities of Newport and Woonsocket, was introduced into the General Assembly at the May session last year at Newport. It was referred to the Committee on Corporations, who recommended that the Act should be indefinitely postponed. It was so postponed, and by all practice and precedent of parliamentary law in Rhode Island, that Act could not be taken up or considered again in the same session. On the last day of the May session, an Act to incorporate the Columbian Land Company was passed, with the consent of Mr. J. E. Addicks as one of the corporators. At the January adjournment of the May sessions, this simple Land Company, with a capital not to exceed $100,000, bloomed out into a Charter with a capital stock not to exceed $5,000,000, and possessing privileges and powers which had never even been sought before in the history of Rhode Island legislation. In the Charter under its own name at Newport, the power over streets was left in the proper hands; and the provision giving the promoters power to buy and sell the stock of other companies was omitted. These extraordinary provisions, under this misleading name were secretly—to use no harsher term—carried through the House of Representatives. That portion of the Committee of Corporations of that House who recommended the passing of the Bill must have known that parties who had already appeared at Newport would desire to be heard on the matter. Did they give them or the cities of Providence and Pawtucket any notice? Not at all. The matter was conducted in so secret a manner that many members of the House who were present at the time the Bill was passed, knew nothing about it. Everyone must admit that the Constitution of Rhode Island intended that any Act of Incorporation of this character, where both public and private interests and rights were so intimately concerned, should receive the careful consideration of both Houses composing the General Assembly of the State. The cities of Providence and Pawtucket, as well as the numerous citizens of the State who were stockholders of the Providence and Pawtucket Gas Companies, were vitally interested in the Bill. Were any of these parties notified of the pendency of this Bill in the Lower House? On the contrary, it was manifest that the fact that any such Bill was pending was carefully concealed from them. The matter came before the House at Newport on its merits; and the Bill did not then contain the monstrous provisions which were now to be found in it, and which had caused such an upheaval of public opinion. The question before the House then was whether they would grant these gentlemen from Massachusetts a charter in the usual form, to compete, if they saw fit, with the local Gas Companies in Newport, Providence, Pawtucket, and Woonsocket. The question was purely and simply whether or not it was for the interest of the people of these cities that rival Gas Companies should be allowed by the Legislature to be started therein; and the result was the indefinite postponement of the matter. Under these circumstances, the Bill was practically dead; and therefore should never have been passed by the Lower House. He asked the Committee, if they agreed with him on this point, to show their disapproval of this sort of legislation by refusing to pass the Bill. In support of his application, he explained the position of gas undertakings in regard to the Legislature, and said that as the State had full control over the

price at which gas should be furnished to the citizens of the two cities immediately in question, it would certainly seem not to be public policy to increase these *quasi*-public corporations in any city or town unless such increase would enable gas to be supplied more cheaply than under existing conditions. Mr. Miner then proceeded to quote the remarks of Mr. Van Slyck, who, as the City Solicitor of Providence, had attended at the previous hearing, under instructions from the City Council, to assist the Committee. His experience of the effects of establishing competing gas undertakings was to the following effect:—On one occasion, when he was a member of the City Council, he was strongly urged to vote for the granting of privilege of laying gas-pipes in the city to a competing gas undertaking. He obtained all the best information he could, and came to the conclusion that it was not a concern brought into the city for the purpose of forcing another to buy them out. He therefore voted for it. The result was the Company began to break up the streets, and build works; and a short time after, the other Company bought them out—as he understood—paying them $500,000. He firmly believed he had contributed something in his gas bills to the old Company for the amount of money required to get rid of the competing concern; and consequently, if he had to vote on the question of the admission of another Gas Company into the city now, with his past experience, he should say "No." Mr. Miner said his own personal experience accorded with that of Mr. Van Slyck; he believed he had been paying for his ignorance ever since he voted for the competing undertaking. He then proceeded to quote from Mill's "Political Economy" the passage in which that writer points out the error of supposing that prices are ever permanently lowered by the competition of gas and water undertakings. He says: "Where competitors are few, they always end by agreeing not to compete. They may run a race of cheapness to run a new candidate; but as soon as he has established his footing, they come to terms with him. When, therefore, a business of real public importance can only be carried on advantageously upon so large a scale as to render the liberty of the competitors almost illusory, it is an unthrifty dispensation of the public resources that several costly sets of arrangements should be kept up for the purpose of rendering to the community this one service. It is much better to treat it at once as a public function; and if it be not such as the Government itself could beneficially undertake, it should be made over entire to the company or association which will perform it on the best terms for the public." Passing on to deal at length with the proceedings of Messrs. Addicks and Co. in connection with the concentration of the gas undertakings of Boston, Mr. Miner said the Gas Commissioners of Massachusetts, who thoroughly examined this matter, expressed the opinion that no competing Company should be allowed, unless it were owned and managed by the city itself—their opinion being formed after a study of numerous cases of unsuccessful competition in supplying gas to cities in both the United States and Europe. If the Committee were satisfied that a single *quasi*-public corporation could make and furnish gas at a cheaper rate in a given city than a plurality, it would seem to be a matter of public policy, if the prices were too high, for this Legislature to appoint a Commission and make them lower. He submitted, in all fairness, that the citizens of Rhode Island who were stockholders of the Providence and Pawtucket Gas Companies ought to be considered in the matter, as long as no complaint was made by the consumers of gas; and as long as the Legislature had the power to regulate the price of gas when any complaint was made, why should they take such action as must depreciate the property of their own citizens to benefit citizens of other States? Having recapitulated the several points he had brought before the Committee, he proceeded to criticize the motives of the promoters of the Bill. He said the real design of these people was not to establish new gas-works in the cities of Providence and Pawtucket; they did not wish to obtain their Charter for any such purpose. What they sought for was an Act of Incorporation for the purpose of using it as a menace to force the Gas Companies of Pawtucket and Providence to sell out to them their plants in order that they might bond them. This had been their course in other places, especially in Boston, where, while advertising a series of bonds secured by all the Companies, they had actually only acquired four of them. They proposed to bond the Companies first, and then acquire them. This method of doing business had made them not unknown to fame. Their reputation had travelled as far as London; and the JOURNAL OF GAS LIGHTING for the 18th of March last, in an article on "British Capital for Foreign Gas-Works," exposed these men and their procedure very thoroughly. The methods then adopted were similar in many respects to those under which the present application was being made; but when the Bill in question came before the Mayor, he had the moral courage to veto and quash it. Mr. Miner next dealt with the financial aspect of the question. He said the promoters had advertised that they had practically acquired the Boston, Roxburg, and South Boston Gas Companies, and had in addition the Bay State Gas Company. So far as the citizens of the State of Massachusetts were concerned, this was actually and literally true. The capital of these Companies was $4,040,000, of which $47,000 was held by 40 citizens of Massachusetts. Upon the property of these Companies, the promoters advertised an issue of $12,000,000 in bonds; and there were already outstanding $7,000,000 of the first series, and $3,000,000 of the second series of bonds of the Boston United Gas Company, $4,512,000 stocks and notes payable, and $2,000,000 income, bonds, of the Bay State Company—making in all about $17,000,000 for which the property of these Companies was pledged as security. Who paid the interest on this $17,000,000? If it was ever paid, it must come out of the consumers of gas in Boston—certainly a novel method of cheapening gas. The present concern had not yet taken a name which was indicative of its personality. Why not give it one which would indicate to the common mind what it really was: "The Wakefield Bond Manufacturing Company, for the Manufacture of Watered Bonds Founded on Gas." Messrs. Addicks and Co.—of Delaware, New Jersey, Massachusetts, and anywhere else—were not manufacturers of water gas (that was a mere incident or side issue), they were manufacturers of watered bonds; and their course hitherto had proved that in this peculiar department of industry they were without a rival. In the manufacture of gas from water anybody could equal them; but in the manufacture of watered gas bonds they led the world. On the 31st of March, 1889, the stockholders of the Providence Gas Company numbered 938; 83, representing 46,188 shares, residing in Rhode Island, and 105, representing 3812 shares, in other States. He asked the Committee to look at what these men had accomplished elsewhere, and the manner in which they had done it. In three Massachusetts Companies controlled by them—the Bay State, the Boston, and the Roxburg—the total capital was $3,100,000, of which $3200 only was held by 15 citizens of that State. Let the Committee compare these figures with those representing the holdings and interest of their own citizens in the Providence Gas Company, where 46,188 of the 50,000 shares of the capital stock were owned and held by citizens of Rhode Island. Take the past record of these men—take the commencement of their record so far in Rhode Island. Were they the sort of men who should be favoured by the Legislature to the detriment of their own citizens? Was this the kind of financiering to be inaugurated by an Act of the General Assembly in their State in order that women, trustees and guardians, small owners, and others who were not able to protect themselves, might be protected not by their own reputable citizens, as hitherto, but by these wonderful travelling financiers. Upon the question of the concurrence of the Senate in the passage of the Bill, could anyone with common sense have a doubt, in view of all the facts in the case, as to the manner in which the Charter had been secretly passed through the Lower House. The real question before them was whether, by recommending the Bill, they would stultify themselves by assisting in the completion of the discreditable work there begun. He could only say, in conclusion, that all legislative precedent of Rhode Island for half a century, all parliamentary precedent ever since parliamentary law had been known, the honour of the State and their own individual honour required that they should disapprove of and condemn such proceedings.

Ex-Governor Taft, speaking for the Providence Gas Company, said the Company had never sought to make extravagant dividends; having endeavoured to confine them to the reasonable 8 per cent. Whenever it was possible to reduce the price of gas, they had done so. The consumption of gas was not enough to employ two Companies at a profit. Mr. Addicks came either to force the old Company to pay tribute, or to obtain the privilege of issuing bonds. The result of his coming would be that the Providence Company would have to compete with him on streets where his pipes would be laid; and, in order to live, would have to raise the price on other streets. Mr. Addicks did not want to supply cheap gas; he wanted to pipe the English people with bonds. He (Mr. Taft) hoped the Committee would give the gentlemen leave to withdraw for ever.

Mr. Olney Arnold, representing Pawtucket, said the question of necessity should be considered. If it was wanted, there were plenty of people in his city who would be willing to invest in a new company. It was the quantity of gas that regulated the price. Now the proposition was to divide the manufacture; and this must increase the cost. The fact that no citizen of Rhode Island had seen fit to take any stock in these regulated Companies showed that the matter had not for a moment been thought of.

After a few remarks from other speakers, the inquiry was again adjourned.

THE BOARD OF TRADE INQUIRY INTO THE RAILWAY RATES FOR MERCHANDISE.

(*Before Lord* BALFOUR OF BURLEIGH *and Mr.* COURTENAY BOYLE, C.B.)

The Classification of Gas-Works Materials.

The hearing of objections raised by traders to the revised classification of merchandise traffic proposed by the railway companies, under the Railway and Canal Traffic Act, 1888, was resumed by the Commissioners on Monday, the 14th inst. A report of the first two days' proceedings, as far as they related to gas-works materials, was given in the JOURNAL last week.

At the outset there was a long discussion, initiated by Mr. Beale (who appeared for the Associated Railway Companies), on the question of attempting to arrive at a general definition of iron damageable or undamageable. It was pointed out, by Lord Balfour of Burleigh, that there was a proposal that the consignor—that was the trader—or the consignee should take the risk accordingly. This, however, was not considered by Mr. Beale to be good law. The traders on the other hand, through Mr. Basil Jayne, stated that there had been no difficulties in this respect in the past. The onus of declaring had always, he said, rested on the consignor. If he accepted the risk of his goods being packed as being undamageable, obviously he had no claim for damage; and the consignee should be, and was bound by, the consignment note of the consignor.

The Court then proceeded to hear objections and suggestions respecting articles under the head of Class B.

Angle-Bars.

Mr. BASIL JAYNE, who appeared for the South Wales and Monmouth freighters, averred that angle-bars were the cheapest form of traffic that the railway companies carried; and he submitted that there ought to be a distinction between 4-ton and 2-ton lots, and that, inasmuch as undamageable iron was practically all carried in 4-ton lots, it fittingly found its place in Class B.

Mr. MASKELL PEARCE, on behalf of the Wigan Coal and Iron Company, expressed the opinion that bar iron or steel, gas, water, and steam pipes, open sand plates, &c., should be placed in Class B, on the ground that they were undamageable iron or steel.

Mr. BEALE said that angle-bars, with various other descriptions of iron, did no doubt come in large quantities from South Wales and other manufacturing districts; but that did not represent what the railway companies had to deal with. They had to deal with the distribution of the iron throughout the country in small amounts; and they considered that, to compel them in all cases to reduce the classifica-

tion of these articles from what it had been all through the country, would not be just to them, and would not be consistent, so far as they were aware, with any of the existing Acts of Parliament.

Mr. BASIL JAYNE contended that where the quantity was carried in 4-ton lots, it would be the manufacturer's consignment, and should be entitled to the "B" rate; and when it was conveyed in only small quantities (in which cases Mr. Beale wished to protect the railway companies), then it would naturally go into a higher class, and be paid for as such.

Runner Bricks.

On these bricks being mentioned, it was stated that the railway companies had not thought it necessary to classify them separately, and that they would fall under the designation of "bricks, common and fire."

Cement.

It was argued on behalf of the building trade that this material should be included in Class B, on the ground that there was no greater risk in regard to it than there was with respect to lime and chalk; and the cement trade supported this argument.

Clay, in Bags or Casks.

Mr. GIBSON pointed out that this was an article admitted by the railway companies themselves to be in the nature of raw material. The market value, as far as the Flintshire district was concerned, was 7s. 6d. and 8s. 6d. per ton, subject to a discount of 10 per cent. It must, he thought, be more convenient for the railway companies to handle cement in bags and casks than if sent loose. Therefore he considered it should be entered in the lowest possible classification.

Mr. TWELVETREES stated that the value of cement was quoted in "Mineral Statistics" at 20s. a ton and upwards. It was a prepared article, and it required sheeting. Therefore, on behalf of the railway companies, he submitted that it should not be placed with the other articles in Class B.

Manure, Manufactured.

On the introduction of this item for discussion,

Mr. VOSS said that the quantity of manure produced was about a million tons per annum. The railway companies had stated that they carried very valuable manures; but the "valuable manures" did not amount to one-tenth or one-eighth of the volume forwarded by rail. Therefore the bulk they conveyed were very low-valued manures. The packed manures—sulphate of ammonia, nitrates, and guano—only represented 800,000 tons out of the million tons manufactured. The railway companies, in their reply to the traders' objections, mentioned that, having regard to the value of, and the risk connected with, these manures, they could not agree to them. With regard to the value, the traders contended that this was not the only guide in classification; and as to the risk, on packed manures it was almost *nil*—in fact, most of the manures were carried at the owner's risk. A manufacturer assured him that he paid £17,000 for railway carriage for manure; and he had not received £10 compensation for damage. With regard to the quantity sent, these manures were always handled in large quantities—in fact, most of the railway companies had rates for 5-ton and 20-ton lots. The usual rate was for 2-ton lots. Respecting the service rendered by the railway companies, he said that they had merely to attend to the conveyance. The packed manures were worth from £2 to £6 per ton. He did not think the simple fact of these packed manures having to be sheeted was sufficient justification for them being placed in Class C instead of Class B; although he would admit that they should be allowed to charge for the sheeting.

Mr. WILKINSON argued that the smell of these fertilizers would not permit of anything else going into the same waggon; and therefore he submitted that the railway companies were here acting fairly in keeping up the Clearing House classification.

Mr. VOSS asked to be allowed to mention that the largest quantity of manure was carried in truck loads. The present Acts of Parliament stated that the railway companies were obliged to carry these substances in 1-ton lots; and now they wanted to compel them to forward 4-ton loads. He considered that it was an injustice to make this alteration.

Muriate of Ammonia.

Dr. HEWETT, representing Messrs. Brunner, Mond, and Co., briefly addressed the Court on the classification of this material. He said that muriate of ammonia and sulphate of ammonia were almost identical. The latter was made by neutralizing ammonia by sulphuric acid; and the former by neutralizing ammonia by muriatic acid. The two were absolutely natural salts by the action on alkalies. They were frequently carried in bags; and the muriate of ammonia had hitherto been in a very high class. In consequence of this and its high price, it had not been brought into use as a manure. His firm were makers of both articles; and they were most desirous to have the muriate of ammonia included in the same class, for like quantities, as the Commissioners decided to put sulphate in. They would be perfectly content to be under similar conditions.

Nitrate of Soda.

Mr. VOSS made a few remarks respecting the value of this article, the production of which, he said, had lately increased very much in quantity. Not many years since, it was worth £15 or £16 per ton; but it was now down to £8. If this reduction went on, in a few years it would be as low as £4 a ton. Nitrates were now being produced from every possible source; and if they succeeded in drawing nitrate from the air, all the nitrogenous manures would be considerably decreased in value. Therefore the present value should not be taken as a sufficient guide, because it varied very frequently. Nitrate of soda would differ in price as much as 10s. in a day; and therefore value would be a most unreliable standard to be taken for this classification.

Pitch, in Barrels and in Blocks.

Mr. STEELE (of the firm of Messrs. Sadler and Co., of Middlesbrough) pointed out that the production of coal-tar pitch was from 450,000 to 500,000 tons per annum. Pitch in blocks was sent very largely from the Midland Counties to Liverpool, Cardiff, and Swansea for the manufacture of patent fuel. Something like 100,000 tons were transmitted to South Wales in a year; and, with an addition of 90 per cent. of small coal, it represented an output of a million tons of patent fuel per annum. Pitch was also used to a large extent for paving purposes. It had only a low value; and on behalf of the Distillers' Association and the Chemical Section of the London Chamber of Commerce, he claimed that when in barrels it should be placed in Class B, and when in blocks in Class A.

Mr. WILKINSON said that the railway companies proposed to put pitch in blocks in Class B; and he maintained that this was a very reasonable suggestion.

Sal Ammoniac.

As to this article, it was intimated that the traders had considered the objections which had been urged by the railway companies in respect thereto; that they regarded their arguments as sound; and that the quantity of sal ammoniac was so small that the classification of it might stand.

The hearing of objections was continued on the following day, when, still dealing with the proposals under Class B, *Sulphate of Ammonia*, *Sulphur*, and *Sulphuric Acid* were mentioned. The first-named, it was pointed out, had been sufficiently dealt with by Dr. Hewett; there were no appearances with regard to sulphur; and sulphuric acid, it was stated, was included in the item of "dangerous chemicals."

Objections and proposals with regard to materials under the head of Class C were next heard. The first article in which JOURNAL readers are interested was

Alizarine (if in Two-ton Lots and Upwards).

Mr. STEELE, having stated that alizarine was a product of coal tar, went on to explain its use. Proceeding, he remarked that there was a very keen competition in this trade; and the price was just one-fifth what it was five years ago. He thought the contention of the railway companies to put this article in Classes 3 and 4, instead of C, would be fatal to a new and large industry which was being developed in this country. He thought alizarine ought to be placed in Class C. They now sent it out in a solution of water; and if it was put into a higher class than C, instead of transmitting a solution of 20 per cent. of the article in 80 per cent. of water, the pure product would be forwarded. This would mean that the railway companies would only have one-fifth of the tonnage that they carried at the present time. When sent in 2-ton lots, the traders should be entitled to the classification of alizarine in Class C. The value of this article at the present time was about £80 per ton.

Mr. WILKINSON said that his information was that alizarine was worth very much more than £80 per ton. It was a small traffic, and very intermittent. Therefore the railway companies considered their proposal was fair—viz., the maintenance of the Clearing House classification.

Lord BALFOUR of BURLEIGH expressed the opinion that no case had been made out for the large change proposed by the traders

Mr. STEELE observed that the suggested change was to meet the depreciation in the value of the article. When it was in Classes 3 and 4, it was worth 3s. 6d. and 4s. per lb., against 9d. now.

Anthracene.

Mr. STEELE described this product from coal tar, and stated that it was carried in large quantities. The trade was not a small one; being at least between 25,000 and 30,000 tons per annum in the United Kingdom. The article ought to be included in Class C, because of the magnitude of the business and the lowness of the price. The value varied from £10 to £15 a ton; and the better classes of it were not above £30.

Mr. WILKINSON said he was informed that crude anthracene was worth from £35 to £40 a ton. The railway companies considered their classification as fair, having regard to the intermittent traffic, the value, and the risk.

Mr. STEELE observed that the railway companies were entirely mistaken as to the value of crude anthracene. The article had greatly depreciated; and was still further depreciating. Anthracene was always forwarded in casks, and was invariably loaded by the tar distillers at their works, and discharged by the consignees, and not by the railway companies.

Carbolic Acid.

Mr. STEELE pointed out that this article was rising to very great importance. At the time the rate was originally fixed, the probability was that the production was not 5 per cent. of what it had developed to during the last ten years. It was now carried, in the form in which Messrs. Sadler and Co. made it, in minimum lots of from 4 to 5 tons. The traders did not think carbolic acid should be included in Class C, having regard to the extent of the traffic, and the fact that it was always loaded by the consignor, and discharged by the consignee, without any special attention at all on the part of the railway companies; nor did the casks or iron drums containing the article require any sheeting or special care. The traffic must have increased from about 5000 tons ten years ago to 60,000 or 70,000 tons at the present time, in one form or another. Therefore to put it in Class 2, amongst small sundry drugs and chemicals, would, he submitted, be a great injustice to a new, and, he regretted to say, a somewhat struggling industry.

Lord BALFOUR of BURLEIGH: It cannot be a struggling industry if it has increased so much as that.

Mr. STEELE: It has increased, my Lord, but the price has dropped very considerably. At the present time, liquid carbolic acid in casks iron drums would range in value from £12 to £20 per ton.

Chemicals, not Dangerous.

Mr. STEELE stated that this heading covered a large number of products that were constantly springing into life, and which it was very difficult to classify. In this Class C, there was an enormous group of sulphates; and at present there were experiments going on in connection with other sulphates which could scarcely vary from the sulphates now made, but could not be properly described as anything but "chemicals, not dangerous." On behalf of the general chemical trade of the country, he thought these articles, which were carried in 2-ton lots, should be put in a lower classification.

Mr. BEALE said that, if a sweeping clause of this description was a desirable thing, he thought it should come as the railway companies proposed in Class 3 for goods packed in casks, iron drums, bales, or bags; and in Class 5 for those not so carefully packed. This would not at all interfere with the power to apply for a new classification under the Act of 1888. The proposal to put the general description under Class C would really be to reduce all the items specified in Classes 1 and 2.

Mr. COURTENAY BOYLE thought there was a great deal to be said against putting this sweeping phrase into the lowest possible class, as that might work an injustice.

The inquiry was then adjourned to last Thursday, in order to permit the Commissioners in the interval visiting Ireland for the purpose of taking evidence.

THE PROPOSED ACQUISITION OF THE CARDIFF GAS-WORKS BY THE CORPORATION.

At the Meeting of the Lighting and Electrical Committee of the Cardiff County Council yesterday week—Mr. Vaughan in the chair—a report containing a revised proposition for the purchase of the gas-works was presented by the Sub-Committee appointed on Jan. 30 last to consider the question. In it they stated that, after protracted negotiations with the Directors of the Company, they had agreed to recommend the purchase of the works at the sum of £505,000—the Corporation to have unfettered discretion as to the employment of the present staff; and the Company to undertake to compensate any of their officials who might not be required. As to the date of transfer, they proposed that it should take place as and from June 25 next. If, however, the Corporation were not then prepared to complete the purchase, the undertaking might, by arrangement, be carried on by the Company on behalf of the Council; the latter paying the present Directors' fees and the shareholders their maximum dividends up to the completion, taking all net profits subject thereto. The whole of the works, the Directors and Engineer had emphatically assured the Committee, were never in such a perfect state of efficiency as now; and as to the distributing plant, out of 95 miles of mains, 20 miles had been laid down or renewed within the past five years. Concerning the progress of the undertaking, the report disclosed the fact that, in the ten years ending 1886, the consumption of gas had practically doubled itself; and the figures supplied showing the consumption during the last three years indicated that the business was likely to continue to expand. In 1887, the consumption was 400,315,000 cubic feet; in 1888, 438,307,700 feet; and in 1889, 453,413,100 feet. With regard to capital, the Committee stated that the Company had unexhausted powers of creating further capital to the extent of £227,428, and had authority to raise loans to the amount of £62,500; so that considerable borrowing powers would accrue to the Corporation on a transfer. It was also, they said, important to bear in mind that the Directors were contemplating the creation of fresh capital in June next, by the issue of new shares to the amount of £50,000; so that in the event of the Corporation deciding not to acquire the works before such issue, any subsequent transfer would have to be based on the increased capital. In considering this question, the Committee submitted that the history of the numerous transfers of gas undertakings to local authorities which had taken place in past years had proved the expediency of the governing body having control of the streets to have also the administration of the gas and water supply; and, from the uniform success which had attended such transfers, it would appear that the terms upon which they had been accomplished, while liberal towards the sellers, had been advantageous to the buyers. The Committee therefore confidently anticipate a substantial profit upon the proposed transaction. As to the borrowing powers of the Corporation, it was pointed out that they were in a position to raise the whole of the money required for the purchase by the creation of Cardiff Corporation redeemable stock, under the provisions of the Cardiff Corporation Act, 1884; and they could no doubt raise the necessary money at a low rate of interest, probably by the creation of 3 per cent. stock at a cost not exceeding 3¼ per cent., inclusive of bankers' charges and loss on first issue. This proposal suggested the following figures:—

Annual profit of the undertaking, based on last half-year's statement—*i.e.*, £9689	£19,378
Minus 3¼ per cent. on the purchase-money—*i.e.*, £505,000	16,412
	£2,965
Plus Directors' fees	750
Estimated annual profit in the hands of the Corporation	£3,715

At the end of the report, the following figures were given, showing the financial position of the Company during the past three years:—

		Capital Account.	Amount of Dividends.	Net Profits.
		£ s. d.	£ s. d.	£ s. d.
1887	June 30	34,092 2 8	5,664 19 7	6,568 19 3
	Dec. 31	33,716 19 3	6,683 2 3	6,022 3 10
1888	June 30	36,197 19 3	7,592 19 5	6,571 0 11
	Dec. 31	37,020 13 4	8,225 0 0	7,724 14 1
1889	June 30	38,758 16 4	8,225 0 0	8,271 3 9
	Dec. 31	39,873 19 10	8,225 0 0	8,631 17 10

The report having been submitted, a short conversation took place on the subject. Some of the members were seemingly inclined to the opinion that the future of gas undertakings would not be so bright as in the past, owing to the increased cost of coal and other materials. It was eventually resolved that the report should be printed and circulated among the members of the Committee, in order that they might fully consider it before the next meeting.

Fylde Water Company.—In the half-yearly report of the Directors of this Company, to be submitted to the stockholders to-morrow, a dividend is recommended on the subscribed stock at the rate of 7 per cent. per annum, amounting to £6235, leaving a balance of £2287.

MR. ELLIS LEVER AND THE MANCHESTER CORPORATION.

The Story of the Great Coal Contract.

The following article, in which is told the story of the great coal contract entered into between Mr. Ellis Lever and the Manchester Corporation, several references to which have been made in connection with recent events in that city and Salford, appeared in the *Manchester Examiner and Times* last Friday:—

So much has been said of late in reference to the ten years' contract for coal between Mr. Ellis Lever and the Corporation of this city, that it may be as well to give the whole story of the agreement, as revealed by the files of the *Examiner and Times*. The first fact which stands out clearly is that, in June, 1882, the Gas Committee had a contract with Mr. Lever for Wollaton cannel, which was not to their liking. On the 15th of that month, the Committee recorded in their minutes that Messrs. Lever and Co. had offered to supply 80,000 tons per annum of Bestwood and Hucknall cannels for five years, at 12s. 6d. per ton, and to cancel the Wollaton cannel contract upon the payment to them of £7500. This offer the Committee decided might be accepted by the Chairman, provided the Wollaton contract were cancelled free of charge; and on the following day, apparently, the matter was settled—the Committee agreeing, however, to enter into a contract for a ten instead of a five years' supply—that is, for 700,000 tons of cannel, at 12s. 6d. per ton—the Wollaton contract being at the same time cancelled gratuitously. On the 5th of July the new contract was to be confirmed by the City Council; and doubtless it was confirmed, although no mention is made of it by the reporters.

At the meeting on the 2nd of August, a storm broke out, which became notable in the annals of the Manchester Corporation. Mr. Councillor Southern wanted to know if it was true that this big contract had been entered into, and whether or not the Gas Committee had made an extravagantly large purchase in order to be relieved from the pressure of former bad business. Mr. Alderman Harwood replied. It was true, he said, that the Corporation had entered into a contract for 700,000 tons of cannel, at 12s. 6d. a ton; but the Committee regarded it as a very favourable contract, for in their opinion cannel and coal could never be lower than they were then. As for the price, Messrs. Lever and Co. had at first asked 14s.; and as much as 20s. 6d. had been paid for similar material.

On the 6th of September the matter came up again. A letter had been received in the meantime by the Committee from Mr. Ellis Lever; and in the absence of Mr. Southern, whose character it reflected upon, it had been entered in the minutes. Mr. Southern now protested against this, and stated that the imputations made against him were untrue. At his request, therefore, the portion of the minutes referring to the letter was referred to the Committee for further consideration. Mr. Alderman Harwood took the opportunity of saying that there was an erroneous impression on the public mind as to an alleged payment to Messrs. Lever and Co. of £7500. The fact was that no such payment had been made, and that no money would be paid, to cancel a contract. Mr. Southern remarked that he had only said the sum of £7500 was demanded—not that it had been paid. Mr. May said there were some members of the Council who were not members of the Gas Committee; and they had to rebut the charge which was made outside—that the whole of the members of the Council seemed to be tarred with the same brush. Upon this Mr. Alderman Harwood wanted to know what was meant. So far as he was concerned, he said, he repudiated being tarred with any brush that was dishonourable to him. He had never received, either directly or indirectly, a single farthing, or any consideration, for anything done in connection with the Corporation. Mr. May said he did not believe the charges; but they were made, and Mr. Harwood knew it. Mr. Harwood, in reply, said he had heard some allegations, which would be inquired into, but he had never heard that anybody had received a bribe. Upon this the matter dropped.

On the 8th of September the Committee made the investigation desired by Mr. Southern, and afterwards reported as follows:—

The subject of the letter bearing date the 10th of August, addressed by Mr. Ellis Lever to the Chairman, was brought under the consideration of your Committee by Councillor Southern; and after hearing and fully considering the statements then made by Councillor Southern, and also the statements subsequently made by Mr. Ellis Lever, who had been invited to attend, and by Councillor Hilton, and after giving careful attention to the documents produced, your Committee came, without difficulty or hesitation, to the unanimous conclusion that the investigation had confirmed in every particular the accuracy of the statement made by Councillor Southern at the recent meeting of the Council, and had conclusively proved that there was not, as far as Councillor Southern was concerned, the shadow of ground, or pretence, for the charges made against him by Mr. Ellis Lever; and, further, that in the opinion of your Committee the writing of any letters containing imputations of irregular conduct on the part of Councillor Southern, which the slightest inquiry would have shown to be utterly without foundation, was wholly unjustifiable on the part of Mr. Lever.

A few days later Mr. Lever apologized for his attack on Mr. Southern in the following terms:—

Colliery Offices, Bowden, near Manchester,
Sept. 11, 1882.

Dear Sir,—I think, after Friday's meeting at the Town Hall, that it is only due to you and myself to express my regret at the language and tenor of my letter to you of the 4th of August, and to the Chairman of the Committee of the 10th of August, and my full withdrawal of the charges expressed or implied in the said letters. I could say much that would explain the acute irritation of mind which led to my writing the letters in question, but I wish in this note to refrain from seeming to prefer any plea of extenuation, and to let my withdrawal of all imputations upon you, and my apology therefore, to be unembarrassed, unhampered, and such as you may accept with the same cordiality as it is now offered by, yours faithfully,

ELLIS LEVER.

Mr. Councillor Southern, Store Street Saw-Mills, Ancoats.

This disposed of the matter as far as Mr. Southern was concerned; but Mr. Councillor Hilton, it will be noticed, had come upon the scene. Of his conduct the Committee reported in the following terms:—

Your Committee have with much regret further to report that, as the result of the investigation, they find that between the 16th of June last, when your Committee adopted a resolution accepting a contract with Messrs.

Ellis Lever and Co. for the supply of cannel, and the meeting of the Council on the 5th of July last, when such resolution would come on for confirmation, Councillor Hilton had written and had verbal communications with Mr. Ellis Lever for the purpose of obtaining from Mr. Ellis Lever a loan, for a short period, of £500; and that, in the course of conversation, he intimated that, in case the money was obtained, opposition to such confirmation might be avoided, and that on the 26th of June he signed and sent to Mr. Lever a promissory note for that amount, which on the 18th day of July was returned to Councillor Hilton, as Mr. Lever declined to make the advance. The Town Clerk submitted the following letter, which he had received on the 22nd inst., from Councillor Hilton; and, under the circumstances, your Committee do not deem it necessary to offer any further observations, but will content themselves with the foregoing statement of the facts:—

Manchester, Sept. 22, 1882.

To Sir Joseph Heron, Knight, Town Clerk of Manchester.—Whilst adhering to my explanation of the matter inquired into by the Gas Committee, between myself and Mr. Ellis Lever, I do not consider it desirable to continue my connection with such Committee, and I beg to resign my position thereon, and at the same time to intimate that I have decided not to allow myself to be nominated for election in November next to the Council.

(Signed) MATTHEW HILTON.

It is not, in the opinion of your Committee, necessary to publish the correspondence; but your Committee have arranged that the same may be inspected in the Town Clerk's office by any member of the Council. Apart from the incidents to which the last portion of the report refers, and which have relation only to the action of an individual member of their body, your Committee are unanimous in their expression of their conviction that there is not a pretence or shadow of ground for any imputation of improper or irregular conduct on the part either of your Committee or of any of its members, or on the part of any of their officers or servants.

On Oct. 4 the whole matter was discussed in the City Council. In reference to himself, Mr. Hilton made a statement in which he said that, while he had been a member of the Gas Committee, he had always entertained a very strong conviction against the policy and practice of the Committee in entering upon large contracts for coal and cannel, extending over a long period of time. When the proposal was made to conclude the contract with Messrs. Ellis Lever and Co., he was distinctly opposed to it. That opposition he had never ceased to maintain. His opposition to the contract was grounded on its great and improper magnitude, and its high price. He was satisfied that the quantity specified was far in excess of what the Gas Committee were justified in purchasing, and that the same material could be obtained at a much lower sum. In the Committee he urged that the Corporation should deal directly with the coal-owners; and that, in any event, the concluding of the contract should be deferred. Those appeals wholly failed. Not satisfied with the procedure adopted in the course of considering and concluding the contract, he resolved to ascertain, if he could by any means, whether any undesirable influences were at work. Accordingly when, through Mr. Fox Turner, an opportunity arose of an interview with Mr. Lever, he determined to avail himself of it. When the meeting took place, he stated, in reference to the proposed contract, that he could not vote for such a large contract, until he was assured that the price was a very low one. Mr. Lever replied that the price was a very low one, and added that he had reduced it from 14s. to 12s. 6d. per ton, which left him little more than the waggon hire, 6d. per ton. He (Mr. Hilton), in the course of conversation, said he had heard that Mr. Lever had paid 3d. per ton commission to a former member of the Council on all the Hucknall cannel which had been delivered to the Corporation. Mr. Lever replied that the report was false, and that he had never paid either commission, or anything in the shape of commission or bribe in his life, and pressed for the name of his (Mr. Hilton's) informant, which he gave, on the understanding that the communication should be considered confidential. Eventually they went to the Albion Hotel, where Mr. Lever made an offer to pay his expenses to America, if he would join a party of them who were going to Denver. He then determined to see what lengths Mr. Lever would go to; and, without any premeditation, he asked for a loan of £500 instead of an American trip, although he was not in want of money at the time. Mr. Lever assented, but asked for a letter applying for a loan, and a promissory note. He (Mr. Hilton) did this; but Mr. Lever never advanced the money, and he used the promissory note as evidence of his (Mr. Hilton's) readiness to have his opposition to the contract bought off. For this imputation there was not the slightest foundation. Had Mr. Lever completed the loan, he (Mr. Hilton) would have treated it as a new and further reason for opposing the contract. When he found that Mr. Lever's offer to lend him £500 was an artifice, he, of course, demanded the return of the promissory note. He perceived that, while he had been endeavouring to search into Mr. Lever's motives, Mr. Lever had been practising on him. He had, however, got his (Mr. Hilton's) writing, while he had not been able to fix Mr. Lever.

In reference to the question of mismanagement, the attention of the Council was called by Mr. Alderman Lamb to an article in the JOURNAL OF GAS LIGHTING, which he described as false, malicious, and scandalous. The article alleged that the cause of the cancelling of the old contract was that the coal supplied, although in accordance with the terms, was quite unsuitable, and caused an irremediable loss. The article went on to say—

It is stated, however, that rather than pay the money compensation demanded, which would have been both an acknowledgment and an exposure of a huge blunder, the Committee gave the contractors a new contract for not less than 700,000 tons of coal, valued at about £440,000, to be delivered as needed during a period of ten years. The price is, moreover, described as being high; but the gravity of the proceeding lies, of course, in the principle of any representative body entering into an engagement of such magnitude without previous advertisement. It would be sufficiently objectionable if dissevered from all suspicion of jobbery; but as it is, the Committee must be considered to have laid themselves open to the most uncomfortable suspicions.

In the discussion which followed, Mr. Alderman Harwood defended the action of the Committee, although he said he was not present when the big contract was entered into. Mr. Southern condemned the action of the Committee; and Mr. Little, although maintaining that their conduct had been honourable, expressed the opinion that it would have been well to have paid Messrs. Lever and Co. £7500 as demanded, to annul the previous contract. Mr. Alderman Lamb wound up the discussion; and, in doing so, expressed his belief that the big contract was the best the Corporation had ever entered into. Mr. Lever, he said, had offered to meet the Committee, with a view to the cancelling of every contract he had with them; but he (Mr. Lamb), as holding an official position, would not take £20,000 to give up the contract which had been so violently attacked. Mr. Southern had laboured to prove that the Committee had given 2s. a ton more than they ought to have done for the Bestwood coal; but, as a matter of fact, they had found that, at any rate in that instance, they could be better served by a contractor like Mr. Lever than by the proprietors of the colliery. The proprietors tendered for 25,000 tons of coal, at the rate of 20 cwt. to the ton, for a period of five years; and the price they wanted was 14s. 6d. per ton. With regard to the Wollaton contract, the coal produced really good gas. The coke, it was true, was worthless; but as the coal was bought at the very cheap rate of 9s. 6d. per ton, there was no loss.

BOLTON CORPORATION AND THEIR COAL AND LIME CONTRACTS.

A Special Meeting of the Bolton Town Council was held on Saturday, the 19th inst., for the purpose of considering the following resolution, notice of which had been given by Mr. Stredder on no fewer than three occasions:—"That the Gas Engineer having reported that the coal supply this winter as being 'very unsatisfactory,' and the quality 'very inferior,' and much 'below the average,' also the lime received for purifying purposes being also 'very inferior' (a recent test case showing it to be over 30 per cent. below what it should have been), a return be made, giving the names of the defaulting contractors, the amount of the 'very inferior' coal and lime, and a statement of the loss to the Corporation thereby for the four months ending Jan. 31 last; also if any steps have been taken to obtain compensation for the loss incurred by the non-fulfilment of such contracts, and if not, why not."

Mr. STREDDER, in submitting his resolution, said it was based on the report of the Gas Engineer (Mr. W. Smith) dated the 6th of January, and he added that it was worth something in these days to have an Engineer who was honest and straightforward enough to make such a report, which could be substantiated by the workmen in their employ. He said that if they did not appreciate faithful service in their Engineer, they were incurring great risk and responsibility, and were opening the door for temptation which might land them some time or other into another Salford gas scandal. He was himself satisfied, notwithstanding the "whitewash," in the shape of the Sub-Committee's report, that the Engineer had good reasons for drawing up such a terrible indictment against the coal and lime contractors. He inquired if it was not a fact that, on the day of the very last meeting, a telegram was sent to a certain colliery, complaining of inferior coal? He asked for the production of the telegram, as it would show that the Chairman of the Committee was in possession of information which he concealed from the Council. This telegram was followed by a letter, asking what repayment the colliery owners were prepared to offer in respect of the coals already sent which were not in accordance with the terms of the contract. No reply was received to this letter, and for a very good reason. The colliery proprietors had read the newspapers, seen the speech of Mr. Alderman Miles, and the report of the Sub-Committee, which completely exonerated them from all blame. Further letters had also been written, refusing to receive certain waggons of coal, and stating that all deliveries in the future must be in strict accordance with the terms of the contract. What did this imply? It meant that the deliveries in the past had not been in accordance with the contract. His resolution asked for the names of the defaulting contractors, so that compensation might be claimed from them. Why should they not have the names of the contractors who had been supplying inferior coal; and why should they not have compensation from these contractors? He could not understand the Chairman and Vice-Chairman allowing these irregularities to continue unless there was a cause. What was the cause? In the present state of the libel laws, he would be a bold man indeed to make any direct charge either against the coal contractors, the Chairman, Vice-Chairman, or Committee; but if the law prohibited him from speaking, he knew of no law that prevented him from thinking. There was only one explanation why the Chairman and Vice-Chairman were contented with the unsatisfactory state of things; and he asked them if they knew anything to prevent them from doing their duty in that Council, and if so that they should resign their positions on the Gas Committee, and act on some other Committee of the Council where their public duties would not be influenced by their private business.

Mr. KIRKMAN, one of the labour representatives, seconded the motion. In doing so he said that, out of fourteen large towns in the North, there was only one in which so high a price was paid for gas as in Bolton; whilst in Hull, Leeds, and Sheffield, only 1s. 10d. per 1000 cubic feet was paid. When they found people in other towns paying from 8d. to 10d. per 1000 cubic feet less than those in Bolton, it proved there must be some loss somewhere, or else the Bolton Gas Committee could make gas for less than they did. They had been having three classes of coal delivered, and paid for at the highest price; and altogether the matter was one calling for special inquiry.

Alderman MILES, Chairman of the Gas Committee, characterized the insinuations made by Mr. Stredder as base and disgraceful. The mover of the resolution had suggested that business matters had influenced him (Alderman Miles) largely in conducting the business of the Gas Committee. If there was any feeling in the Council that such a state of things existed, he was prepared to submit his business books to the members of the General Purposes Committee. He said he had done nothing without the sanction of his Committee; and if the Council would possess itself of a little patience until the balance-sheet was presented, it would be found that in the Gas Department greater zeal had been displayed than before. The complaints which

appeared in the books about the coal were highly coloured to keep everybody straight; and he reiterated his statement, made at the previous Council meeting, that the gas produced proved clearly that the wild assertions uttered could not be true. As to the lime question, they had purified more gas by this material during the past year than they had for many years previously. With regard to deductions, these had been made. During the past two years the Engineer had not recommended any course in regard to sending coal back, or deductions, in which the Committee had not loyally backed him up to the very letter. Briefly analyzing the resolution, he said there were, to his knowledge, no defaulting contractors; the only default being what was pointed out at the last meeting—that of occasional failures to screen the coal in dark weather.

Mr. STREDDER asked if the Committee had claimed compensation.

Alderman MILES replied in the affirmative, and gave instances. He said he challenged the fullest inquiry into the conduct of the affairs of the Gas Department.

On a vote being taken, after considerable discussion, the resolution was defeated by 32 votes to 4.

EXHIBITIONS OF GAS APPLIANCES.

Last Wednesday week, an exhibition of gas appliances, promoted by the Southampton Gas Company, was opened in the Skating Rink by the Chairman (Mr. R. C. Hankinson), who was supported, among others, by the Secretary (Mr. C. C. Smith) and the Engineer (Mr. S. W. Durkin). In a suitable little speech, Mr. Hankinson pointed to the great improvements and developments which had been made in gas apparatus and appliances, and stated that gas owed a great deal to its "friend" electricity, as it had induced a craving for more light, and to this gas companies certainly did not object. The exhibition, which was closed last Thursday, was a very representative one, comprising samples and models of apparatus and appliances from a retort to high-power lamps and cooking and heating stoves. Gas-meters were shown by Messrs. W. and B. Cowan, Messrs. Parkinson and Co., and the Gas-Meter Company, Limited. Messrs. Edge and Ticehurst exhibited one of their automatic gas extinguishers. Messrs. Lancaster had on view an original form of gas roaster, which was made so prominent by the late Mr. Sharp, formerly the Manager of the Southampton Gas-Works, and who was one of the pioneers of cooking by gas. Sugg's "Parisienne" stove was also exhibited; and Messrs. T. Fletcher and Co. displayed specimens of their well-known goods. Local firms were also well to the fore with exhibits. On the whole, the exhibition was pronounced to be one of the best ever brought together in the borough. During the course of the exhibition, Miss Ida Cameron gave practical demonstrations of the many advantages to be derived by the use of gas-stoves in the preparation of food.

An exhibition of gas appliances was held during the past week, under the auspices of the Gas Company, in the Corn Exchange, Oxford. The function of "opening" the exhibition was fitly performed by the Mayor (Mr. Alderman Hughes), who is also the Chairman of the Gas Company. The exhibition was divided into three sections—(1) lighting, (2) domestic heating, &c., and (3) motive power. The Wenham Company were entrusted with the lighting arrangements; and the Corn Exchange and approaches were brilliantly lit up with their famous lamps. The second department was in the hands of Messrs. T. Fletcher and Co., who showed samples of their apparatus for heating and cooking, as well as for scientific and manufacturing purposes. The motive-power section was confided to Messrs. Crossley Bros., who exhibited a 50-light slow-speed dynamo, driven by a 4-horse power "Otto" gas-engine. The engine was erected in a temporary curtained room, lit by 27 incandescent lamps, including two clusters. The object of the exhibit was to show that it was possible to obtain electric light from a gas-engine at a cheaper rate than if supplied from a central station. Attendants were in charge of the various sections for the purpose of giving any information required by visitors concerning the exhibits; and they were greatly aided in their duties by Mr. James Eldridge, the Engineer of the gas-works.

The Mayor of Rotherham opened an exhibition of gas appliances in the Drill Hall of that town last Wednesday. In the course of the brief ceremony, it was stated that his Worship, Mr. J. Goodwin (the Engineer of the gas-works), and Mr. T. Bellamy (the Secretary of the Gas Department) had all exerted themselves to make the exhibition perfect; and the result showed that their labours had met with success. There was no restriction as to the number of firms exhibiting; so that there was an excellent and varied display of goods in each class. Messrs. W. Sugg and Co., the Fourness Company, and the Wenham Company showed examples of their special forms of lamps and burners; while Mr. W. B. Watson, a local tradesman, exhibited, among other regenerative gas-lamps, one of the latest competitors for public favour—the "Etoile" lamp. Messrs. Guest and Chrimes, and Messrs. Stott and Co. had on view fine collections of their manufactures. Mr. George Wright, a local tradesman, exhibited, among other articles, Mr. D. R. Gardner's cover for gas-globes (which was noticed in our "Register of Patents" on the 8th inst.). Stoves for cooking and heating, and other domestic gas appliances were displayed in abundance by Messrs. H. and C. Davis and Co., of London, Messrs. J. Wright and Co., of Birmingham, Mr. Unsworth, of Warrington, Messrs. Arden Hill and Co., of Birmingham, Messrs. Wilson and Sons, of Leeds, Messrs. R. and A. Main, of Glasgow, and Messrs. Greenall and Co., of Manchester. A capital selection of similar goods was shown by local firms—Messrs. Yates, Haywood, and Co., Messrs. Micklethwait and Co., and Mr. Mark Liversidge. One of their celebrated gas-engines was exhibited by Messrs. Crossley Bros. After the opening, the members of the Corporation were entertained to luncheon by the Mayor. During the exhibition, Mrs. J. B. Thwaites delivered lectures in the afternoon and evening of each day.

An interesting exhibition of gas-fires and other domestic gas appliances was held last week, under the auspices of the Boston (Lincs) Gas Company in the Shodfriars' Hall in that town. It was arranged by Mr. J. S. Dougall, the Company's Manager, and comprised a large variety of Wilson stoves. On the opening day (Tuesday), Mr. Dougall introduced Miss Peacock, of the Yorkshire School of Cookery, who gave the first of a series of cookery lessons, which were continued twice daily during the period of the exhibition. In addition to the excellent display of stoves, "Meteor" gas-lamps were on view—six being employed in the lighting of the hall; and visitors had an opportunity of seeing the mechanism of gas-meters, some of these instruments, in glass cases, being exhibited. There was a good attendance.

COMBINED ELECTRIC LIGHT AND GAS UNDERTAKINGS.

The Scheme of the Buda-Pesth Gas Company.

We have already noticed in the JOURNAL the negotiations which have been going on between the Municipality of Buda-Pesth and the Gas Company in that city, with the view to the introduction of electric lighting. According to a correspondent of the *Electrical Review* (from whose communication we take the following particulars) the matter has now entered upon a stage which appears to be favourable to the carrying out of the scheme.

According to the existing agreement, the Gas Company have not merely the exclusive right to the use of public localities, streets, squares, and lanes, for light conductors of every kind (electric leads included), for the term of the agreement, but for ten years after the expiration thereof; and in case of the grant of concessions for the use of lighting arrangements of any kind, the Company enjoy priority as against all rival applicants. By these privileges, the free development of the electric light in Buda-Pesth has been hindered; but if the recent proposals of the Company are accepted, the city will obtain the right of granting, at its option, concessions for erecting electric works. The Company it seems, are desirous of obtaining the prolongation of their agreement for a further term of ten years. They have expressed satisfaction with certain modifications of their agreement, and have undertaken to include electricity in the scope of their operations. The Committee appointed to conduct the negotiations asked, in return for the prolongation of the concession (1) that the price of gas per cubic metre should be reduced to 10 kreutzer; (2) that the gas required for public lighting should be supplied gratis for all the lamps, and without including the cost of maintenance; and (3) as regards electric lighting, that the Company should claim neither the exclusive right nor the priority of supply, and that the cost of the light must not exceed the present price of gas. In the reply of the Company these proposals were discussed separately and jointly with regard to their practical signification; and it was shown that the acceptance of the demands raised would involve a sacrifice of 3½ million florins.

In order, under such circumstances, not to interrupt the progress of the negotiations, it has been attempted, in accordance with the wish of the President of the Committee, to find a solution of the question as regards gaslight alone, separately from the question of electric lighting. To this end the following proposals have been made by the Company:—"On condition that the agreement between the capital and ourselves for the exclusive right to supply gaslight is prolonged for 15 years, we are prepared to renounce our right to the introduction of the electric light or any other means of illumination, and to leave the Municipality perfect freedom. We merely stipulate that the competition must remain free—that no one receives a privilege, a favour, an exception, or an advantage as compared with other competitors, so that every one, including our Company, may compete on an equal footing, and submit proposals. By this conditional renunciation the capital is enabled at once to enter into negotiations for electric lighting, to invite competition, and to select the most advantageous proposal. The prolongation of the gas agreement will not interfere with all this in the least." The Company are still prepared, immediately on the acceptance of the prolonged agreement, to reduce the price of gas for private consumers successively to a minimum of 10½ kreutzer per cubic metre, and after the expiration of the present agreement, to furnish gratis the gas required for public lighting, in the proportion of the consumption of 1888.

As regards these proposals, the Committee state that the offer of the Company is a valuable concession. The Municipality can now proceed freely with or without the Company, as may be found advantageous, with the installation of the electric light. At the same time, there is the prospect of lowering to a minimum the cost of public lighting, and of greatly reducing the price to private consumers. Generally, the offer of the Company may be accepted as a basis for detailed negotiations. It is thought the Committee will formulate certain proposals going beyond those of the Company—*i.e.*, that the price of gas to private consumers should be at once reduced to 10 kreutzer (about 2d.) per cubic metre. But it can scarcely be doubted that an agreement will soon be reached as regards the critical points.

According to the calculations of the chief Municipal Accountant, the concessions made by the Company in their last proposal represent a fixed amount of 1,500,000 florins, and a yearly sum of 243,000 florins, to which must be added the Company's renunciation of their prior claim as regards the introduction of other means of lighting. These are the compensations which the Company are prepared to make to the city for the prolongation of their agreement for 15 additional years. The report of the Committee charged with conducting the negotiations concludes with the following proposals:—(1) The Gas Company shall be required to set up their works in Buda-Pesth as an independent undertaking. (2) After the acceptance of the agreement with the Company, the Committee shall determine the conditions on the basis of which a public competition for the introduction of the electric light in the city are to be invited.

Reduction in the Price of Gas at Clacton-on-Sea.—The high price of gas at Clacton has always been a great drawback to its general use. Four years ago it was 6s. 6d. per 1000 cubic feet; and it was then reduced to 5s. 10d., with a liberal discount for prompt payment. The Directors have now decided to lower the charge to 5s. from Midsummer next, allowing the same discount as formerly.

JOHANNESBURG WATER-WORKS COMPANY, LIMITED.

A Meeting of Shareholders of the above Company, convened by the London Agents of the Company (Messrs. Davis and Soper), was held at Winchester House, Old Broad Street, on Monday last week, to consider the position of the undertaking. Mr. W. BARNATO, M.L.A., presided.

The CHAIRMAN, in opening the proceedings, said that, addressing a body of London shareholders for the first time, he desired to place before them a full exposition of the affairs of the Company; and to this end he could not do better than read from the reports of the Manager (Mr. G. P. Andrews). Since he left South Africa, things, he admitted, had not gone on as he would have liked; but no good would result from crying over the past. What they now had to do was to look to the future. If they only had the support of the shareholders, he thought it would be easy to show that they possessed a property which there was no cause to regret. The present Manager was sent out at the desire of many shareholders, who thought that things had been mismanaged on the other side; and certainly they had not been going on very brightly. It had been no sinecure for him, for they were surrounded by enemies—interested persons—on all sides, and the Government itself was not very friendly towards them. He endorsed the action of the Manager in disposing of some of the late servants of the Company. Writing on Feb. 11 last, Mr. Andrews reported that he had succeeded in clearing the dams of the filth and dirt washed therein, caused by the railway works, in which they had cut deep trenches, nearly a mile in length, by their pumping-station, without providing proper outfall for the surface. He had since been able to keep up a good pressure of water in the town from 6 a.m. to 4 p.m. each day; and they now heard very few complaints on account of the want of water. Since making out the new list of customers, there had been an increase of £7908 a year in the income from water charges. Mr. Andrews called attention to the failure in raising the £60,000 by debentures, and the necessity for obtaining this sum by other means as early as possible, as they had from the Johannesburg Consolidated Investment Company a loan of £27,000, and bills due amounting to £7475 18s. 7d., besides the cost—about £2000—of the completion of the service reservoir now nearly finished, and, in addition, the present overdraft of £3480 at the Natal Bank. The above amounts, added Mr. Andrews, which had been spent in permanent works, ought to have been drawn from capital instead of revenue. The assets of the Company were as follows:—Property account, £104,750; new water right, Doornfontein, £18,000; plantation account, £4000; service reservoir, £13,000; pumping-station, £4000; storeage reservoir, £1000; town service, £80,000; machinery and plant, £5000; tools and implements, £3000; buildings, £10,000; furniture account, £750; new mains, £7000; indents on order, £11,000; new permanent works, £13,311 12s.—total, £274,811 12s. The existing liabilities stood thus: Consolidated Investment Company, £27,000; drafts, £7500; completion of service reservoir, £2000; overdraft on Natal Bank, £3500—total, £40,000. Mr. Barnato then read extracts from letters received at various times from the Manager, in one of which, dated the 14th ult., it was stated that the present revenue was more than ample to meet the working expenses, exclusive of capital expenditure; but that the officials were seriously impeded by the claims of sundry creditors. In conclusion, the Chairman said it was necessary, if the property was to be saved, for the shareholders to come to the rescue; and he, for one, believing that the concern was not in such low water as some would have them believe, was willing to assist on behalf of his firm, which held between 35,000 and 40,000 shares. He was satisfied that, notwithstanding the opposition that had been raised against them, the shares of the Company were worth three or four times the value at which they were at present assessed.

Some conversation, of a critical nature, having ensued,

The CHAIRMAN said he would be pleased to take any responsibility the shareholders liked to throw upon him; but if they did not desire to strengthen the hands of their opponents, or wreck their property, he would ask them to support him. Their property was a good one, irrespective of their land rate, which was something about £10,000, and their water-rate of £30,000. His proposition was that a body of men, in whom they had entire confidence, should be elected to act in co-operation. They would want at least from £45,000 to £50,000, which would amount to between 4s. 6d. and 5s. a share—the shareholders to take them *pro ratâ*. He would be pleased to pay his share. He added, in reply to a question, that the amount would not exceed £50,000 or £60,000. This would carry them right through, and put them on a solid basis.

Mr. SOPER then moved—"That this meeting recommends the issue of first mortgage debentures for £60,000, bearing interest at 7 per cent., to be issued at £95 for the £100; and that a Committee of six shareholders be appointed to confer with the London Directors as to the position of the Company, and to report to the shareholders."

Mr. J. OGLE seconded the motion.

An amendment was submitted, to the effect that the capital be not raised until after the report of the Committee; but this was ultimately withdrawn, and the original motion carried unanimously.

The Committee having been appointed, a vote of thanks was passed to the Chairman, and the proceedings terminated.

Sale of Shares.—At the Auction Mart, Tokenhouse Yard, on Wednesday last, Messrs. Fox and Bousfield sold by auction nearly one-half of an Adventurer's share and nearly a quarter of a King's share in the New River Company. The portion of the King's share was sold in fractions of 120th and 72nd parts of a share. Of the former, 2 lots sold at £850 each; 7, at £845; and 4, at £840; and of the latter, 4 lots sold at £1365; 1, at £1360; and 3, at £1350. The portion of the Adventurer's share was divided into lots each comprising 1-12th and 1-72nd part of a whole share. Five lots of 1-12th of a share realized £8300 each; and two lots consisting of 1-72nd part sold for £1430 each. Some annuities of £2 10s. per annum in the London Bridge Water-Works were then offered; but of these only three were sold—one, at £85; and two, at £84.

THE STOCKTON AND MIDDLESBROUGH WATER BOARD'S BILL.

The Solicitors who have in hand the Bill of the Stockton and Middlesbrough Water Board have drawn up a report in which they state that the Chairman of Lords Committees (Lord Morley) objects to report in favour of the clause in the Bill relating to the sale to sanitary authorities of the mains and fittings, at prices to be fixed by arbitration in default of agreement; to the payment of moneys borrowed in connection with the costs of the Act over twenty years instead of fifteen; and to the extension of the period of the repayment of borrowed money by the South Stockton Local Board from sixty to ninety years; and they recommend the withdrawal of these clauses.

At the last monthly meeting of the Board, Mr. W. Anderson said there was a matter in the Bill relating to South Stockton which he wished to fully understand. The Clerk to the Water Board, the Clerk to the South Stockton Local Board, and he had fully discussed the question that morning; and they had determined upon a recommendation which was to the effect that the Board agreed to advise the Middlesbrough and Stockton Corporations and the South Stockton Local Board to apply for a Provisional Order in the next session of Parliament to alter the 51st section of the Board's Act of 1876 so far as to provide that the net revenue of the water undertaking should be divided in the proportions in which the different authorities were respectively interested—viz., Stockton, five-twelfths; Middlesbrough, six-twelfths; and South Stockton, one-twelfth. Mr. Anderson explained that his objection to the present position of South Stockton was that, whereas they had only 60 years in which to repay the money borrowed by them on account of the water undertaking, the other contributing authorities were allowed 90 years. Thus at the end of 60 years, under the present Bill, South Stockton would be left at the mercy of the two Corporations; and all the net revenue could and might be taken to meet the demands of Stockton and Middlesbrough. If this recommendation were passed, it would get over the difficulty; but if the members did not adopt it, it would be very much better for the Local Board to have their time for the repayment, and the whole of the borrowed money under the Bill altered to 60 years. After a brief discussion, the recommendation was approved.

ROCHDALE CORPORATION WATER SUPPLY.

The Rochdale Corporation Water Committee's accounts for the past, and their estimates for the current year, are now ready. They show tha 1889-90 has been an extraordinarily successful year so far as the water-works are concerned. Last year the Committee asked for £12,000, though the actual deficiency was £12,700; the difference being made up by a balance in the profit and loss account. This account again shows a favourable balance; and the Committee consequently ask for £10,000, although the falling off for 1890-1 is estimated at £10,200. The £10,000 asked for will more than meet the net deficiency. The deficiency this year is £2500 less than it was last year. The difference is principally accounted for by an increase of £600 in the receipts from ordinary rentals (water used for domestic purposes), an increase of £700 on the sales for trade purposes, and sundry other items of increased receipts. Upwards of £900 has been saved in interest on loans. This is due to the fact that certain operations of the Finance Committee, originated 18 months ago, when arrangements were made for the re-borrowing of the Corporation loans at reduced rates, have taken effect during the year. The total increase in the receipts of the department during the twelve months was £1471 more than those for 1888-9, and the expenditure decreased from £38,000 to £37,000. The report is the most favourable one the Committee have presented for many years; and the call on the rates is lower than that for any year since the completion of the Spring Mill reservoir. The reduction in the Committee's demand will, it is stated, make a difference of at least 2d. in the pound in the rating of the borough. The following figures show the increases in the water-rentals in the years named:—In 1890, £1300; in 1889, £465; in 1888, £1263; in 1887, £73; in 1886, £1299; in 1885, £1125; in 1884, £963; in 1883, £420; in 1882, £223. The amounts received from the borough fund in the nine years were as follows:—£12,000, £13,000, £14,000, £14,500, £14,000, £13,000, £15,000, £12,000, £9500. The large increase in the water rental in 1888 was due to the drought of 1887, when Heywood paid Rochdale more than £800 for water supplied to them. Bearing in mind that the amount to be asked for from the borough fund is this year only £10,000, it will be seen that a point within £500 of 1882 has been reached. Since that time enormous expenditure has been incurred at Spring Mill and Cowm; and therefore it is gratifying that the consumption has grown sufficiently to counterbalance the consequent increase in interest and repayment of capital.

Plymouth Corporation Water Committee.—In the JOURNAL a fortnight ago, it was mentioned that the rejection by the ratepayers of Plymouth of the Water Bill of the Corporation had led nine members of the Water Committee to tender their resignations. At the meeting of the Borough Council at which these were accepted, several names were submitted to fill the vacancies, but only four gentlemen were found willing to serve. Since then the Committee have succeeded, with the approval of the Council, in making up their number to the original figure.

Totnes and Bridgetown Gas Company.—In the report of the Directors of this Company, which will be presented at the annual general meeting of the shareholders on the 5th prox., it is stated that, although the price of coal and other materials is now much higher than it has been of late years, they have not yet been compelled to raise the price of gas, the consumption of which continues to increase satisfactorily. A dividend of 10s. per share, free of income-tax, is recommended. Referring to the proposed testimonial to Mr. G. Livesey, the Directors consider that the Totnes Company should show their approval of his action by contributing to the fund.

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday.*

As is pretty well known, the Duke of Edinburgh is to open an exhibition in Edinburgh next week, which was started as an Exhibition of Electrical Appliances, but has developed into one of the ordinary vast conglomerations of industrial products which have been so frequently got together of late years. The truth is that so long as the promoters of the exhibition stuck to electricity alone, the public gave them very little support. Mr. Lee Bapty was then appointed General Manager, and the scheme was broadened out till it includes nearly everything under the sun. It will be just an ordinary show, with a rather large electrical section—said to be the largest which has yet been brought together, though I very much doubt the statement. It is early yet, however, to speak of what is to be shown; because, though within four working days of the opening, the electrical section is very incomplete. One thing which is very conspicuous, is the absence, hitherto, of exhibits by Edison. These were to have been brought over from the Paris Exhibition; but they have not come, and the space set apart for the Edison and Swan Company is a blank. Officials say, however, that exhibits are coming; but from America, not from France. It is rumoured—though, naturally, there is considerable reticence on the subject — that the so-called Edison exhibits are to be paid for by the Executive, or in other words, that they are to hire a phonograph and other novelties which are intended to catch the public eye, and make a show of them, but of course, in Edison's name—a proceeding which he is not likely to object to. The buildings are, it is almost needless to say, to be lighted by electricity; but even in this Electrical Exhibition, gas is not to be altogether excluded, for the buildings have been fitted with gas-lamps, to be used at night, and, presumably, in case of a breakdown of the electric lighting. I wonder at the arrangement, because it is nothing less than a practical illustration of the weakness of electric lighting. Had it been at all profitable to use electric lighting during the hours of cleaning and watching, there need be no hesitation in saying it would have been employed; but even a body who have banded themselves together to give electricity "a hand up," are obliged to own that it would not pay them. The query arises, If it would not pay the Exhibition Executive to employ it for all purposes, how is it likely to be suitable for general consumers? Besides, as a subsidiary light, gas will be largely used for a variety of other purposes, such as driving engines, baking, &c. As exhibitions go, the show is a well got up one; and as a spectacle it will be worth a visit. I must, however, reserve my comments on its practical value till all the exhibits are forward.

The high price of coal, mentioned in my last week's "Notes" as applicable to Edinburgh, has been the theme of a good deal of talk with many who are outside gas circles. Of course, it was known to those inside; and though to outsiders the announcement was a matter of surprise, it was not to them. My information on the Edinburgh contracts was not so complete as I could have wished—having come to me late. But I am able to supplement it with the statement that the price of the best parrot coal has advanced from 18s. to 32s. per ton; and that the total quantity contracted for next year is 126,000 tons. The parrot coal used in Edinburgh is largely obtained from the Marquis of Lothian, whose pits at Newbattle are at present being taken over by a limited liability Company, to be worked along with others in the vicinity. This circumstance will probably not appreciably affect the price of coal. What has more effect is the large quantity of parrot and cannel which is being sent abroad. I understand the reason for such a heavy foreign demand is to be found in the trouble with the miners on the Continent. Naturally one would look upon this as a temporary cause, and conclude that after it had passed away, prices would resume their normal level. But there operates against this probability the fact that the foreign demand has cleared out home stocks, leaving the coalmaster without anything to draw upon. This is the position in which the miner has striven for years to place the coalmaster; and having got him into it, the workmen's combinations are doing their utmost to keep him in it. The accumulation of coal at pitheads is, therefore, a thing scarcely to be looked for so long as trade remains good. The prospect of coal falling to its former price, in these circumstances, need scarcely be looked for, for some years at least. Whether it will come down at all depends on other considerations. The foreign demand is likely to slacken as the season goes on, though it may not quite cease. One of the first things, of course, to put a stop to it will be the high price which is asked here. One feels disinclined to look upon a check to the trade of the country as a thing to be reckoned with; but undoubtedly high-priced coal is more likely than not to have an effect in that direction, and both causes operating together will probably lead to more moderate prices before the year is out. It has to be remembered, however, that cannel is getting scarce, and that a reduction in price with reference to it is not so probable as in the inferior varieties.

Mr. Alex. Smith, the Manager of the Corporation Gas-Works in Aberdeen, is feeling the pinch of the high price of coal; and without making any ado over the matter, he has lowered the quality of the gas he supplies—from 27 to between 25 and 26 candle power. When the Gas Committee met on Wednesday, some of the members expressed dissatisfaction with the reduced quality; but Mr. Smith explained to them that he was obliged to reserve a considerable quantity of his better coal for future use. This is an ingenious method of tiding over the difficulty. He has contracts which go on till September; and if he can lay up a sufficient quantity of the best coal out of the present contracts, he will be able to maintain the present reduced quality without raising the price of his gas. A conversation took place upon the question of whether the Corporation should not contract for a year's supply, instead of for six months as hitherto. Mr. Smith is of opinion that they should adopt the longer period; and the Committee, by way of experiment, authorized him to take offers for both periods, reserving the question till they see what is offered.

The Forfar Gas Corporation have taken a bold step in connection with their coal contracts. Finding that the price has advanced to the amount of 10s. or 12s. per ton, and that they have as much coal contracted "for this year," as will serve them till October, they have resolved not to enter into any contracts at present, but to wait till the autumn, in the expectation that easier prices will then rule. The Corporation have used less coal this year than was estimated, on account of strikes among workers, and some of the mills using electric light. There are two questions to consider with reference to the step they have taken—first whether it is likely that coal will be cheaper in October than now, and second whether contractors who have agreed to supply coal for the current year, will be content to go on supplying it at the present contract price after the year is out. On the first point, I think, taking everything into account, they are right to postpone their new contracts, if they are satisfied on the second question. If they are not satisfied upon it, then the step is a dangerous one, because it will leave them at the mercy of whoever they may purchase their coal from, should the contractors not be found willing to go on with their supplies. In any event, October is probably too late to put their contracts off to. July would be a more likely time to get better terms, unless the market be disturbed by extraneous causes.

From our Glasgow Correspondent.

GLASGOW, *Saturday.*

The great parliamentary contest which has been so long looked forward to, and which is so big with fate, has now commenced before a Committee of the House of Lords, presided over by Lord Romilly. I refer to the fight over the Bill which the Glasgow Municipal authorities are promoting for taking in all nine suburban burghs, and which proposes to add to the area of 6111 acres forming the present Glasgow, an area of 9488 acres north and south of the Clyde, to make the "Greater Glasgow." The scheme proposes to take over about 200,000 of an additional population, which, with the population of 557,000 in the existing Glasgow, would make a city of upwards of three-quarters of a million, and which would well earn the title of the "Second City of the Empire," a name which has frequently been claimed on its behalf for a number of years. In the event of the Bill being passed, there is every probability of the Partick, Hillhead, and Maryhill Gas Company having its career brought to an early termination. The existence of the Company has already come up in the opening Counsel's speech, which was delivered on Thursday, at the first sitting of the Committee, and in the evidence which has since been led. A petition has been lodged on behalf of the Gas Company, but not against the extension scheme. It states that almost the entire gas supply of the burghs of Partick, Hillhead, and Maryhill, and of the adjoining districts, is owned by the Company; the capital being upwards of £188,000, while the supply of gas has now risen to nearly 300,000,000 cubic feet per annum. The Company's objection to the Bill is that it would constitute the Corporation of Glasgow a competing gas producer, and would alter the relations existing between the Company and their customers. But Mr. Pope, Q.C., in his opening speech, pointed out that the area of the Company was at present within the gas supply limits of the Corporation; and that the Corporation were competing with them just as much now as they would when the boundaries were extended by the passing of the Bill. Moreover, a clause in the Bill provided that the Police Commissioners of Glasgow, or, in other words, the Corporation, in their capacity as Road Authority, should grant to any company or person supplying gas within the added district all reasonable facility for laying down, altering, repairing, or renewing any gas-pipes. The Gas Company, in their petition, allege that if the Burgh of Glasgow were extended, the Corporation ought to buy up their undertaking, or else the Corporation should relinquish their powers of supply. Such a proposition, he (Mr. Pope) was sure, the Committee would not consider for a moment. Sir James King, Bart., the late Lord Provost, was the first witness called for the promoters of the Bill; but nothing was got out of him on the gas supply question until near the close of his cross-examination. Mr. Moulton, Q.C., appeared on behalf of the Gas Company; but Mr. Balfour Browne objected, on the ground that the Company were protected by the saving clause, and if not, at the proper time a clause protecting them could be introduced. Mr. Moulton replied that *locus standi* had been allowed in other similar cases; and as the Company supplied four-fifths of the gas in the district, he thought that they were entitled to be heard. The Chairman said that the Committee were unanimously of opinion that, as the opposition of the Gas Company alone would not induce them to reject the Bill, the cross-examination must be allowed. Supposing that the Bill were passed, the Committee thought that the Gas Company should be protected by clauses at the proper time. Mr. Moulton stated on behalf of his clients that the Company had been established for the purpose of supplying gas to the people living in the western and north-western districts outside the burgh boundary of Glasgow, as the Corporation had been charging them a higher rate than that charged within the burgh. The Corporation of Glasgow, their competitors in the gas supply, had refused to buy them up at arbitration rates. They put no clause of that kind in the Bill; and it was on those grounds that he proposed to ask witness some questions. Sir James King, in reply to Mr. Moulton's questions, stated that it was in 1869 that the Corporation obtained powers to put down pipes in Partick, Maryhill, and Hillhead; and that for the gas which they supplied to the population of those districts outside the Corporation limits they charged a differential rate. He further stated that it was owing to this circumstance that the Gas Company was formed for those districts. Yesterday's principal witness was Mr. Alexander, who has been twenty-eight years a member of the Glasgow Corporation, and is at present Chairman of the Parliamentary Bills Committee. He remembered, he said, that when the Corporation took over the gas and water supply they put a differential rate on the gas supplied to Maryhill and the adjoining suburban districts. Having undertaken obligations, the Corporation got rating powers, and in consequence they were able to borrow money much cheaper. That being so, they thought that the citizens of Glasgow should get the benefit of it; and accordingly the price of gas was reduced to them 2d. per 1000 cubic feet, the rate being left as formerly in the outlying districts. Mr. Osborne also stated that the Gas Company on one occasion applied for further powers, which were refused.

I am told that the Partick, Hillhead, and Maryhill Gas Company's

Bill asking for a regularly legalized existence and for extended powers will come up for consideration on Thursday, May 8; but when the fate of the Glasgow Boundaries Extension Bill may be settled, it is very difficult to say.

It was reported to the last meeting of the Ardrossan Police Commissioners, who are also the Gas Commissioners for the burgh, that the Harbour Company had intimated that the new gas-mains which had been talked of would not be required, as they had resolved on the adoption of the electric light. It was not their intention, however, to discontinue the use of gas at the Old Harbour.

A report was lately submitted to the Wishaw Corporation Gas Committee by Mr. M'Nair, the Gas Manager, in which he estimated that the cost of extending the gas supply to the Craigneuk district of the burgh—a long-talked-of-matter—would be about £880. The minutes also showed that the Gas Committee had accepted an offer from Messrs. R. Laidlaw and Son, of Glasgow, to supply the necessary pipes, bends, and drips.

I learn from Johnstone that a special meeting of the Police Commissioners of that burgh has been held, at which they had an interview with Mr. James M'Gilchrist, of Dumbarton, when it was agreed, on the recommendation of that gentleman, to erect a telescopic gasholder having a storeage capacity for 120,000 cubic feet of gas, or about double the present holder capacity. Plans have been prepared; and it is probable that the work will shortly be proceeded with, the present being considered a very suitable time for doing so.

Mr. David Laidlaw, the senior partner of the old-established concern of Messrs. Robert Laidlaw and Son, gas and water engineers, is, I believe, the oldest representative of the mechanical engineering profession in Glasgow. He is the "son" of the original firm; and consequently it is not very surprising to learn that the business with which he has all his life been identified had its origin upwards of a hundred years ago. He is exactly the age of Mr. Gladstone, the ex-Premier, almost to a day, and he has been called Glasgow's "G.O.M." in his profession. Some time ago he was in somewhat poor health; but for the last couple of months or so he has been enjoying himself in Algiers, he being now quite set up again.

In an action for damages lately raised in the Glasgow Sheriff Court, in which the Glasgow Corporation Gas Commissioners were cited as joint or alternative defenders for compensation for injuries by a person who fell into a pipe trench where large gas-mains were being laid at the instigation of the Gas Trust, the defenders were assoilzied by the Sheriff; but the Tramway Company, who were also cited, were held liable, and damages were assessed against them for £100 by Sheriff Spens. The case may be appealed to the Sheriff-Principal.

The pig iron market has again been very flat during the past week, and Scotch warrants have fallen in price from 45s. 7d. per ton on Monday, to 44s. 3½d., at which there were sellers at the close yesterday afternoon. Hematite and Cleveland warrants fluctuated in price during the week between 53s. 1d. and 53s. 7½d. for the former, and between 46s. 6d. and 44s. 9½d. per ton for the latter—the closing prices yesterday afternoon being, respectively, 53s. 3d. and 43s. 9d. per ton cash buyers. The quotation for Scotch iron is now 22s. per ton under the top price paid since the opening of the present year.

Business in the Glasgow coal trade has slackened off this week, and reductions of 3d. per ton in the price have been very general. Within the past three weeks, the price of household coal has declined to the extent of 1s. per ton.

The Northern Coal Trade.—Under the stimulus of fuller shipments to the Baltic, the northern coal trade shows more activity, especially for steam coals. For best Northumbrian qualities, the price varies now from 12s. 6d. to 13s. per ton, according to the time of delivery; and some large contracts have been concluded. Gas coal is very firm—about 13s. 6d. free on board being the quoted price for best Durham. Though the local consumption has fallen off very much, the exports are large, and some of the London Gas Companies seem to be laying in stock, so that the output is well taken up. The miners, however, are working more steadily; and hence there is not the same difficulty in procuring supplies that there was a short time ago. Other kinds of coal are not so well placed as the steam and gas coal branches. A number of coke-ovens have been laid idle because of the dulness in the iron trade; and the coal that would have been coked is put into other markets. In consequence, bunker coal is cheaper than it was; sales having been made as low as 10s. 6d. per ton, which shows a fall in price. Household coals are very slow of sale. There is a good demand for manufacturing coal; but it is not quite so fully in request as it was three months ago.

Gas v. Electricity for the Public Lighting of New York.—In the JOURNAL last week we announced that the New York Commissioners of Public Works had decided to return to gas lighting for the streets of the city. This decision was come to after an examination of the various tenders sent in for the public lighting for the twelve months commencing on the 6th prox. The following were the prices submitted:—The New York Mutual and Consolidated Gaslight Companies' prices were the same—$17.50 a year for each lamp. The Equitable's was $12; but they are forbidden by their Charter to charge more. The Central's price was $27; the Northern and Yonkers', $28. The offer of the New York and New Jersey Gas Companies (naphtha) for Woodlawn Heights was $22.50. The Standard Company, who cannot charge the city more than $12.50 a year for each lamp, declined to tender. The United States Company bid for 314 lamps at 39c., 41c., and 42c. a night; and the Brush Company, for 337 lamps at the same prices. The Mount Morris Company tendered for 175 lamps at 39c. and 42c.; the Harlem Lighting Company, for 166 lamps, at 39c., and 19 lamps in Mount Morris Park at 50c.; and the East River Company, for 226 lamps at 42½c. This made 1237 lamps in all; leaving 109 not tendered for. The Manhattan Company did not tender. The average price for electric lighting last year was 35c. per lamp. The tenders were all referred to the Superintendent of Public Lighting (Mr. M'Cormick); and it was doubtless on his report that the Electric Lighting Companies' offers were declined.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 26.

Sulphate of Ammonia.—The market has continued quiet during the present week. The Continental demand has been very slack; and transactions have consequently been of limited dimensions. Prices are somewhat easier, and the value to-day is £11 5s. f.o.b. Hull. The present condition of the market has meanwhile caused a cessation of forward business, and no sales are reported. Contracts for Leith delivery are being offered, principally from second hands, at £1 7s. 6d.; prompt sulphate being worth £11 5s. Nitrate is firmer in all positions, with an advance of about 5s. per ton in values; cargoes at port of call having brought 8s. 1½d. There being now no possibility of arrivals on a scale lately experienced, a maintenance of at least present rates, if not even some advance, appears more than probable. Value on spot 8s. 1½d. to 8s. 3d. per cwt., with a steady tone.

LONDON, *April* 26.

Tar Products.—In sympathy, no doubt, with the unsatisfactory outlook in other trades, tar products, with the exception of benzol, are not so strong as they were. It looks very much as if pitch, anthracene, and oils will see lower prices. Buyers declare they cannot afford the prices now quoted, particularly for pitch and anthracene; and unless there is an important advance in the value of fuel and colour, both must fall. Important business is reported in benzol; and the present low value of carbolic acid has resulted in a good deal of inquiry, which may bring that article into better odour. During the week the following prices have been paid:—Tar, 25s. to 30s. per ton, according to position. Pitch, 27s. to 29s. per ton. Benzol, 90 per cent., 3s. 7d. per gallon; 50 per cent., 2s. 7½d. Toluol, 1s. 10½d. per gallon. Solvent naphtha, 1s. 9d. per gallon. Crude naphtha, 1s. 2½d. per gallon. Light oil, 4d. per gallon. Lucigen oil, 2½d. per gallon. Ordinary creosote, 2½d. per gallon. Carbolic acid, 2s. 3d. per gallon. Anthracene (30 per cent.), "A" quality, 1s. 3d. per unit; "B" quality, 1s.

Sulphate of Ammonia.—There is no change in this market, which is as dull as it can be. The efforts to talk down prices have been far more successful than is warranted by the business actually doing. Stocks are low; but, unfortunately, makers are weak. Very few sales have transpired; and they have all been at prices ranging from £11 3s. 9d. to £11 5s., less 3½ per cent., according to position and delivery. There is no change in gas liquor, which is marked, 5° Twaddel, 6s. 6d. to 8s. 6d. per ton.

The Mundesley-on-Sea Water-Works Company, Limited, has just been registered with a capital of £3000, in £5 shares, to furnish a supply of water to the parish of Mundesley-on-Sea, in Norfolk.

Gas Exhibition and Cookery Lectures at Sidcup.—Next Thursday, the Cray's Gas Company will hold an exhibition of gas cooking-ranges, gas-fires, and other apparatus for the economical use of gas, in the Sidcup Public Hall. A series of lectures on cookery, with hints on the regulation and management of gas-stoves, will be given by Miss Agnes Kelman.

The Mid-Kent Water Company's Order.—The Board of Trade have intimated that they will not include the parish of Aylesford in the Provisional Order asked for by the Mid-Kent Water Company. This part of the scheme was opposed by the Maidstone Water Company, who have an agreement with Mr. Brassey to supply a certain quantity of water on his estate.

The Stapleford and Sandiacre Water Company, Limited, has been registered with a capital of £20,000, in £10 shares, to acquire shares in the capital of the Stapleford and Sandiacre Water Company, and any debentures or other securities of the Company, and to subsidize or otherwise the undertaking, and, if thought fit, to acquire it and any of the property, rights, and liabilities of the Company.

Camborne Gas Company.—It was announced at the recent meeting of this Company that, although neighbouring companies had seen fit to advance the price of gas by 6d. per 1000 cubic feet, the Directors had only found it necessary to raise their charge by 3d.; and further that, among the improvements contemplated at the works, they had arranged for the gasholder to be telescoped.

Buenos Ayres Water Supply.—The Directors of the Buenos Ayres Water Supply and Drainage Company, Limited, state, in their report, that the agitation in connection with the tariff is reported to be dying out, and that the new scale of rates at present in use is calculated to allay further opposition on the subject. These rates vary from $1 to $12 per month, according to the class of property supplied.

Ripon Corporation Water Supply.—At a special meeting of the Ripon City Council last Wednesday, the Water Supply Committee recommended the construction of a service reservoir at Whitefield, of a capacity of 500,000 gallons of water in preference to one at High Cross to contain 250,000 gallons, and also that application be made to the Local Government Board for power to sell the old pumping-station and land. These recommendations were approved of.

Gringley Gas-Works in the Market.—On Monday of last week, the gas-works, with plant complete, and two tenements, belonging to the Gringley Gas Company, near Retford, were offered for sale by auction in the latter town. The highest bid was £1110; and the property was withdrawn. The auctioneer stated that there had been a lack of enterprise in taking up the shares; and it had been decided to throw the concern into liquidation. The works had cost about £2000.

Warrington Extension and Water-Works Bill.—A special meeting of the Warrington Town Council was held last Wednesday for the purpose of confirming or otherwise the promotion in Parliament of the Bill for the extension of the borough, the purchase of the water-works, and the effecting of various sanitary improvements. The Mayor (Mr. Alderman Francomb) formally moved, and Mr. Alderman Sutton seconded, that the Bill be confirmed. The resolution was carried by 25 votes to 2.

Gas Explosion at Bradford.—Early last Friday morning an explosion of gas, followed by an outbreak of fire, occurred at the shop of

Mr. J. Macdonald, a tobacconist in the Manchester Row, Bradford. A small gas jet is usually left alight in the shop; and it is supposed that the explosion was caused by gas leaking from a pipe in the cellar, and entering the shop. Fortunately, Mr. Macdonald, who was the only person on the premises, succeeded in escaping uninjured. It is estimated that damage to the amount of £800 was done.

Cookery Lectures at Dorchester.—On Tuesday, the 15th inst., Miss Garstin, of the National School of Cookery, commenced a series of practical lessons in cooking at the Town Hall, Dorchester, to demonstrate the superiority of gas over coal for culinary purposes. They were initiated by the Dorchester Gas Company, who exhibited a number of stoves, grates, and burners, showing the latest improvements in gas apparatus; the Manager (Mr. F. Osmond) being in attendance to give any required explanation. The lectures were continued twice each day till the 18th, and were very successful.

Bombay Gas Company, Limited.—The report of the Directors of this Company for the half year ending Dec. 31 last, states that the revenue from the gas and meter rental exhibits an increase of £2074 as compared with the corresponding period of 1888, which, with residual products and profits on sale of fittings, &c., makes a total increase of £3185. The loss on exchange amounted to £8736. The balance at the credit of general revenue was £10,270, from which the Directors recommended a dividend of 4 per cent. (making with the interim dividend already paid 7½ per cent. for the year), free of income-tax. This will absorb £9600, leaving £670 to be carried forward. Reference is made to the loss the Company have sustained by the death of Mr. Alfred Penny, and to the appointment of Mr. F. Lane Linging to fill the vacancy on the Board caused by that event.

The Public Lighting of the City of London in the Past Year.—According to the report recently presented to the Commissioners of Sewers by their Engineer (Mr. W. Haywood), on the works carried out by that body during the past year, the price charged by The Gas-light and Coke Company for the gas supplied to the public lamps was 2s. 2d. per 1000 cubic feet. The number of defective gas-lights observed during the year was 356. The meters showed that the full contract quantity of the gas was given at all the lamps. Reference is made to the resolution of the Commissioners that all the streets in the City should be lighted by electricity, and to their invitation for tenders for the work. One contract for lighting the central district had been concluded with the Anglo-American Brush Electric Light Company, and others were under consideration, when the report of the Engineer was made.

Dinner of South Metropolitan Gas Company's Employees.—On Friday, the 18th inst., the "old hands" employed at the Thames Street, Greenwich, works of the South Metropolitan Gas Company, had their first annual dinner at the Norman Arms, Greenwich—the Engineer of the station (Mr. J. F. Braidwood), presiding. After dinner, the usual loyal toasts having been disposed of, the toast of the evening—"Success to the Chairman and Directors of the South Metropolitan Gas Company"—was given by the Chairman, and responded to by Mr. R. Trill. Mr. E. Borthwick proposed the "Health of the Chairman and his Family;" and the hearty manner in which it was received testified to the esteem in which he is held by those serving under him. The proceedings were of a thoroughly enjoyable character; being enlivened by songs.

The Combination of Local Authorities for Electric Lighting Purposes.—It was announced, by the Chairman of the Hampton Wick Local Board (Mr. H. Parsons), at a recent meeting, that it had been discovered that under the Electric Lighting Acts there was no power for two or more local authorities to combine for electric lighting purposes, although a trading company could undertake the lighting of any number of parishes. The Town Clerk of Kingston and himself had recently had an interview with the Board of Trade authorities upon the subject; and they had promised to bring in a short Bill to remedy this defect. No company could come in without the sanction of the local authority, although the Board of Trade could override the local authority in the matter; but they had promised that in the meantime no Provisional Order should be granted to any Company for that district.

Odessa Water-Works Company, Limited.—The report of the Directors of this Company for the year ended Dec. 31 last, which will be presented to the shareholders at their meeting to-morrow, states that the water-rents amounted to £53,092, against £47,620, and the miscellaneous receipts to £3570, against £3530, in 1888. The continued improvement in the value of the rouble for the year shows that the loss by exchange for 1888 of £853 has been converted into a profit of £576, and the net revenue, after meeting interest on debentures and all charges, including drawn bonds, amounts to £10,211, against £8845. The Resident Engineer reports that during 1889 the quantity of water pumped from the River Dniester shows an increase over that of 1888 of 22,171,590 gallons. The Directors recommend a dividend of 4s. per share, free of income-tax, on the "A" shares, carrying forward £4211.

Georgetown (British Guiana) Gas Company, Limited.—The Directors of this Company, in their report to be presented to the shareholders at the half-yearly general meeting on the 20th prox., stated that the profit for the six months ending Dec. 31 last, amounted to £1432, which, added to the balance brought from the previous account, makes £3147. After paying the dividends to June 30, and the interest on debentures to Dec. 31, 1889, there remains an available balance of £1859, out of which the Directors recommend the declaration of a dividend for the past half year on the preference capital at the rate of 8 per cent. per annum, and on the ordinary capital at the rate of 7 per cent. per annum, both less income-tax (except on dividends payable to local shareholders). This will leave about £692 to be carried forward. The Engineer and Manager (Mr. T. B. Younger) reports that the works and mains, and plant generally, are in good order and repair.

The Overhead Electric Lighting Wires at Exeter.—The Exeter City Council, at their meeting last Wednesday, had before them a letter from the Directors of the local Electric Light Company, acknowledging a resolution of the Council declining to allow them to make an extension of their system unless the wires were carried underground. The letter pointed out that the Board of Trade considered that underground electric light mains could not legally be laid, either with or without the sanction of the local authority, unless statutory powers were obtained, and that the condition imposed by the Council would prohibit any extensions of the Company's system. The Directors felt sure that this result could not have been foreseen by the Corporation. At the same time they were desirous to meet the wish of the latter that the wires should be placed underground through the main streets of the city; and they had accordingly decided to proceed at once with the necessary steps to obtain a Provisional Order which would give them the requisite power. No resolution was passed.

Proposed Revival of the Huddersfield Water-Works Bill.—On the 31st ult., the Water Bill of the Huddersfield Town Council, which had been under the consideration of a Select Committee of the House of Commons for several days previously, was withdrawn by the promoters. Since then the General Purposes Committee have had the matter under consideration; and, on their recommendation, the Corporation have resolved to make an attempt to revive the Bill in the present session. At last Wednesday's meeting of the Council, it was reported that a Sub-Committee had had an interview with the London and North-Western Railway Company, who had strenuously opposed the Bill, and who had now agreed to the following terms:—"Repeal the proviso to section 68 of the Act of 1875, and enact that the Company shall not supply water within the Corporation limits for the purposes mentioned in the said section other than from their existing sources of supply, without any additional reservoirs or works or enlargement of existing reservoirs or works." It was resolved by 25 votes to 4 to accept these terms.

Proposed Extension of the Workington Gas-Works.—Last Tuesday, Colonel J. O. Hasted, R.E., held an inquiry at Workington touching an application of the Town Council for sanction to borrow £10,000 for extending the gas-works, street improvements, and sewage outlet works. The proposed gas-works extension first occupied attention, for which purpose £1000, it was stated, was required. Evidence was adduced showing that the consumption of gas had increased from 26 million cubic feet in 1886 to 39 million feet in 1889. The various additions which had been made to the works, and the amounts borrowed for the purposes were detailed. It appeared that there was only a debt of about £13,000 upon the gas-works, which were worth in commercial value from £45,000 to £50,000. The price of gas last year was 2s. 6d. per 1000 feet; and a profit had been made of over £800. Mr. T. Eden, the Assistant Gas Manager, gave the details of the pipes to be laid, and the extensions to be made under the present scheme, and the estimated cost of the various portions. There was no opposition to the application.

Bankruptcy of Mr. G. Weller.—Mr. George Weller, gas lessee and engineer, recently appeared at the Truro Bankruptcy Court to undergo his public examination. In answer to Mr. Matthews, of London, who represented Mr. Darlington, a creditor, debtor said he commenced business in June, 1886, previous to which he was Manager of the Aldershot Gas Company. He started at St. Ives with a capital of £200, his wife's money. He paid about £150 for the stock-in-trade, including 100 tons of coal, a quantity of lime, coke, tar, &c. He took the Gunnislake Gas-Works in February, 1887, paying about £40 to enter. At Christmas, 1887, he acquired the gas-works at Newquay, at which time his finances were in a healthy state. In 1887, he accepted a contract for the works at Blackwater, and received from the Government £1000 a year for two years. The expenses of working were more than he received by £200 a year. Debtor, who had offered 3s. 6d. in the pound, was questioned at very considerable length by Mr. Matthews as to his transactions with Mr. Darlington and others; and eventually he passed his examination.

The Price of Gas at Salford.—The Gas Committee of the Salford Corporation recently appointed a Sub-Committee to inquire into the financial position of the gas-works, with the view of considering whether it was desirable to increase the price of gas. The Sub-Committee have now submitted a report on the subject to the Gas Committee. It appears that on account of the strike of the retort-house hands, and, to a still greater extent, in consequence of the reduction in the price of gas which was made twelve months ago (the price was then reduced from 2s. 10d. to 2s. 6d. per 1000 cubic feet), the revenue of the department showed a considerable falling off during the financial year which ended on the 25th ult. The Sub-Committee suggest, however, that it is not desirable to increase the price of gas. It is hoped that by keeping the charge low, the consumption may go on increasing, and, that, with the aid of the increased receipts from this source, and vigilant supervision on the part of the Committee and the Gas Engineer, the works may be brought into a more satisfactory financial position during the year now started upon.

Threatened Strike of Gas Stokers in Vienna.—The Imperial Continental Gas Association have been experiencing some trouble with their stokers in Vienna. During the early part of last week several meetings were held at which the men formulated their demands, the refusal of which would, it was anticipated, result in a strike. In view of this difficulty, adequate measures were adopted by the officials of the Association to meet the emergency; and police protection was secured for the works. Happily a strike was averted—at least for the present—thanks to the prompt intervention of the police, and the resolute, but at the same time conciliating attitude of the Managers. According to the Vienna correspondent of *The Times*, the wages of the stokers are 2fl. 25kr. to 2fl. 90kr. (equal to about 4s. to 5s.) a day, while unskilled labourers receive from 2s. to 3s. Nevertheless, they demanded an increase of 50 per cent., and the reduction of the working day to eight hours. When, however, they were reminded that on repeated occasions their wages had been raised spontaneously, that their present demands were unreasonable, but that the Directors were willing to adjust any real grievance, and when, moreover, they saw the works occupied by strong detachments of police, they declared that they would further consider their position, and continue to work for at least a fortnight. During the interval it is expected the Directors will be able to come to an amicable arrangement with the men, or engage a sufficient number of new hands to take their places.

East Huntingdonshire Water Company.—A petition to wind up this Company came before Mr. Justice North, in the Chancery Division of the High Court of Justice, last Saturday. Mr. Swinfen Eady, who appeared in support of the petition, said the matter had stood over on several occasions to allow of certain works being carried out with a view of testing a well now being sunk by the Company. As it was anticipated that the well would be a success, it was agreed by all parties that the petition should stand over until July 19 next.

Conviction for a Violent Assault on a Gas Stoker.—At the Lambeth Police Court last Saturday, James Uden, a stoker, was summoned for violently assaulting Robert Osborne. Mr. Underwood attended on behalf of the South Metropolitan Gas Company, in whose service the complainant was, and said it appeared that at the time of the strike both men were employed at the works in the Old Kent Road. Both belonged to the Gas Workers' Union; but the complainant refused to come out on strike. A few days ago the defendant met the complainant and wanted money of him. He refused to give any, and then defendant abused him as to his conduct during the strike, knocked him about, threw him violently to the ground three or four times, and hurt him very much. It was the desire of the Directors of the Company to give every possible protection to their workmen. Mr. Partridge said the assault was a most cowardly and unprovoked one, and sentenced the defendant to two months' hard labour.

The Incandescent Gas-Light Company, Limited.—The third annual meeting of this Company will be held to-morrow to receive the Directors' report and the statement of accounts for the past year. An extraordinary meeting will afterwards be held to consider and, if approved, to agree to four special resolutions. By one it is intended to cancel the first three resolutions passed and confirmed at the meetings of the shareholders on Jan. 30 and Feb. 14 last. The second resolution proposes a reduction of the capital to the extent already sanctioned; but it is suggested to slightly vary the mode of effecting this reduction. The third resolution is in identical terms to the second one passed at the meeting in January, with this addition at the end—"Provided that such preference shares shall only be issued in accordance with the fourth resolution passed and confirmed at the said meetings held on Jan. 30 and Feb. 14, 1890, except that the words 'not being later than June 1, 1890,' in such resolution, shall be treated as expunged." The last resolution refers to the voting at meetings and in polls of the shareholders.

Another Dispute at the Bristol Gas-Works.—Another dispute occurred last Friday at the Avon Street station of the Bristol United Gaslight Company; and it threatens to lead to serious complications. A grievance of the men culminated about a week ago, when the stokers at this station threw down their tools, and refused to work until they obtained redress. The Chairman of the Company (Mr. J. W. S. Dix) saw the men in the afternoon, and promised that they should be fairly dealt with. This, however, the men say has not been done; for they allege, in addition to the men who have to leave in rotation, other old hands are being discharged and new men engaged in their places. It is further said that attempts are being made to induce the men to leave the Union. The Committee of the Gas Workers' Union called a mass meeting of the men, and it was held on Friday evening. Mr. R. Nicol submitted a statement which was to be sent to the Directors and left with them for consideration until to-morrow. The men state in the communication that they desire a guarantee that, in future, when the time for dismissal comes, the young hands shall leave first and the old hands in rotation, and *vice versâ* when the time for re-engagement arrives; and also that, if the Directors are not pleased with anything, they should have a conference with the men. Mr. Nicol strongly recommended the men not to adopt any rash measures. No action will therefore be taken until after to-morrow.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

For Stock Market Intelligence, see ante, p. 783.

Issue.	Share	When ex-Dividend.	Dividend for Yr. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	16 Apr.	10½	Alliance & Dublin 10 p. c.	10	17—18*	..	5 16 8
100,000	10	,,	7½	Do. 7 p. c.	10	11½—12½*	..	6 0 0
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	109—111	..	4 10 1
100,000	20	28 Nov.	8	Bahia, Limited	20	20—21	..	7 12 4
200,000	5	14 Nov.	7½	Bombay, Limited	5	6¾—7	..	5 7 1
40,000	5	,,	7½	Do. New	4	4⅞—5¼	..	5 17 10
380,000	Stck.	27 Feb.	12½	Brentford Consolidated	100	218—223	+1	5 9 10
125,000	,,	,,	9½	Do. New	100	160—165	..	5 12 2
220,000	20	13 Mar.	11	Brighton & Hove Original	20	40—42	..	5 4 9
320,000	20	28 Mar.	11½	British	20	44—46	..	4 17 10
50,000	10	13 Mar.	11	Bromley, Ordinary 10 p. c.	10	18—20	..	5 10 0
39,000	10	,,	8	Do. 7 p. c.	10	13—14	..	5 14 3
328,750	10	14 Nov.	10	Buenos Ayres (New) Limited	10	12—13	..	7 13 10
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	105—108	..	5 11 1
150,000	20	27 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 4
550,000	Stck.	16 Apr.	13¾	Commercial, Old Stock	100	247—252*	+1	5 9 1
130,000	,,	,,	10½	Do. New do.	100	200—205*	..	5 4 10
130,000	,,	30 Dec.	4½	Do. 4½ p. c. Deb. do.	100	118—123	..	3 13 2
557,320	20	12 Dec.	13	Continental Union, Limited	20	46—48	..	5 8 4
242,680	20	,,	13	Do. New '69 & '72	14	32—34	+1	5 6 7
200,000	20	,,	10	Do. 7 p. c. Pref.	20	37—39	..	5 2 6
75,000	Stck.	28 Mar.	10	Crystal Palace District	100	195—205	..	4 17 7
234,060	10	30 Jan.	13	European, Limited	10	25—27	+1	4 16 4
120,000	10	,,	13	Do. New	7½	18—19	..	5 2 10
354,060	10	,,	13	Do. do.	5	12½—13½	..	4 16 4
5,470,620	Stck.	13 Feb.	13¾	Gaslight & Coke, A, Ordinary	100	247—252	−1	5 9 1
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	100—103	..	3 17 8
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	253—258	+3	3 17 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	121—125	..	4 0 0
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	180—185	..	4 1 1
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	162—166	+1½	4 4 4
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	253—258	+6	3 17 6
1,061,150	,,	12 Dec.	4	Do. 4 p. c. Deb. Stk.	100	115—120	..	3 6 8
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	122—127	..	3 10 10
650,000	,,	,,	6	Do. 6 p. c. do.	100	160—170	..	3 10 7
3,800,000	Stck.	14 Nov.	12	Imperial Continental	100	223—227	..	5 5 8
75,000	5	12 Dec.	6	Malta & Mediterranean, Ltd.	5	5—5½	..	5 9 1
560,000	100	1 Apr.	5	Met. of Melbourne, 5 p. c. Deb.	100	112—114	..	4 7 9
541,920	20	28 Nov.	6	Monte Video, Limited	20	19—20	+½	6 0 0
150,000	5	28 Nov.	10	Oriental, Limited	5	8¾—9¼	+¼	5 8 1
60,000	5	28 Mar.	7	Ottoman, Limited	5	5½—6	..	5 16 8
166,870	10	26 July	4	Pará Limited	10	3⅝—4⅛	..	8 17 9
				People's Gas of Chicago—				
420,000	100	2 Nov.	6	1st Mtg. Bds.	100	100—105	..	5 14 3
500,000	100	2 Dec.	6	2nd Do.	100	95—100	..	6 0 0
100,000	10	16 Apr.	10	San Paulo, Limited	10	14—15*	..	6 13 4
500,000	Stck.	27 Feb.	13¾	South Metropolitan, A Stock	100	280—290	..	4 11 5
1,350,000	,,	,,	11½	Do. B do.	100	225—235	..	4 17 10
141,500	,,	,,	12	Do. C do.	100	240—245	+2½	4 17 11
650,000	,,	30 Dec.	5	Do. 5 p. c. Deb. Stk.	100	140—145	+3	3 9 0
60,000	5	27 Feb.	11½	Tottenham & Edm'nton, Orig.	5	11—13	..	4 8 5
				WATER COMPANIES.				
728,446	Stck.	30 Dec.	9½	Chelsea, Ordinary	100	260—265	..	3 11 8
1,720,560	Stck.	16 Apr.	7½	East London, Ordinary	100	207—210*	..	3 11 5
544,440	,,	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	143—148	..	3 0 10
700,000	50	12 Dec.	9	Grand Junction	50	123—127	+1½	3 10 10
708,000	Stck.	13 Feb.	10½	Kent	100	271—276	..	3 16 0
1,043,800	100	30 Dec.	9½	Lambeth, 10 p. c. max.	100	254—258	..	3 13 7
406,200	100	,,	7½	Do. 7½ p. c. max.	100	197—202	..	3 14 3
200,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	122—126	..	3 3 6
500,000	100	13 Feb.	12½	New River, New Shares	100	363—368	..	3 5 10
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk.	100	127—130	..	3 1 6
902,300	Stck.	12 Dec.	6	S'thwk & V'xhall, 10 p. c. max.	100	163—167	..	3 11 10
126,500	100	,,	6	Do. 7½ p. c. do.	100	154—159	+2	3 15 6
155,066	Stck	12 Dec.	10	West Middlesex	100	260—265	..	3 15 6

*Ex.div.

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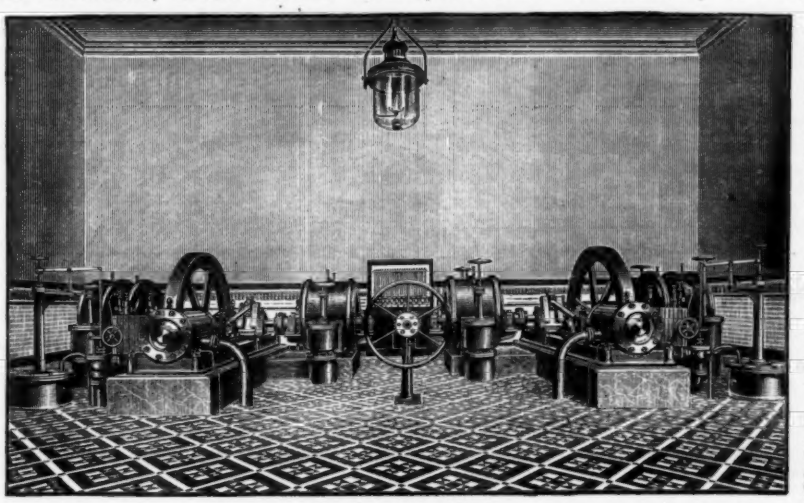

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*** See Advertisement p. 814 of this week's issue.

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Apply in first instance, by letter, to No. 1812, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Directors of the North Bierley Gas Company have FOR SALE (cheap) two PURIFIERS, 18 ft. by 11 ft., with Covers, Lifting Gear, 12-inch Connections, and two 12-inch Four-Way Valves, in good condition.

The Boxes may be seen, and further information obtained, on application to Mr. W. Oldfield, Manager.

By order,
EPHRAIM SUCKSMITH, Secretary.
Gas-Works, Oakenshaw, near Bradford,
April 26, 1890.

FOR SALE—Seven Purifiers, 15 feet square, with Sieves, Connections, Valves, and Lifting Apparatus complete.

One PURIFIER, 20 ft. by 16 ft., with Sieves, Connections, Valves, and Lifting Apparatus complete.
One SCRUBBER, 20 ft. by 6 ft. diameter.
(The above may now be seen at work.)
Two Wrought-Iron TANKS, 8 feet diameter by 7 feet and 6 feet respectively.
One REID'S GAS WASHER.
Two Cast-Iron TANKS, 15 ft. 8 in. diameter by 11 ft. 4 in. and 8 ft. 6 in. respectively.
Two EXHAUSTERS (Jones), equal to 25,000 cubic feet per hour.
A number of 15-inch and other VALVES.
A quantity of SHAFTING and PULLEYS.

J. HEPWORTH.
Gas-Works, Carlisle, April 28, 1890.

SOUTH SHIELDS GAS COMPANY.

SALE OF GAS STOCK.

T. GLOVER & SON are instructed by the Gas Company to SELL by PUBLIC AUCTION, in the Board-Room, at the Gas Offices, Chapter Row, South Shields, on Friday, May 16, 1890, at One o'clock prompt, £8000 of NEW STOCK, under the South Shields Gas Act, 1886.

The Stock will be put up in Lots of £10 each nominal value.

A deposit of 10 per cent. to be paid on the Purchase-Money at the Sale; the remainder to be paid on or before the 30th day of June next.

If the Purchaser pays the full amount at the time of Sale, he will be entitled to interest thereon at the rate of 4 per cent. per annum up to and payable on the 30th of June, 1890.

The Dividend has been 10 per cent. during the past Seven years.

By order of the Directors,
J. H. PENNEY, Secretary.
Gas Offices, Chapter Row, South Shields.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. Spent Oxide and Sulphate of Ammonia purchased. 120 and 121, NEWGATE STREET, LONDON, E.C.

TUBES.

FOR Gas, Steam, and Water; Galvanized, White Enamelled, and Hydraulic Tubes, &c.
JOHN SPENCER, Globe Tube Works, WEDNESBURY and 14, Great St. Thomas Apostle, LONDON.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID for making SULPHATE OF AMMONIA of high quality and colour. *Delivery in Railway Tank-Wagons or Carboys.*

Highest References and all particulars supplied on application.

EXTRACT from the Harrogate Gas Company's Report, dated the 5th of February, 1890: Coal consumed, 8600 tons. Gas made, 99,880,000 feet; ditto sold, 84,880,000 feet; ditto unaccounted for, 8,000,000 feet; quantity made per ton, 10,800 feet; ditto sold, 9869 feet. Illuminating Power, 16·1 candles. Coals used, Brancepeth. Owners, Strakers and Love, Newcastle-on-Tyne; who have also Brandon Hutton Seam Unscreened Gas Coal. Analysis, 10,500 cubic feet per ton; Illuminating Power, 16·2 candles.

GAS EXHIBITION.

THE Godalming Gas Company propose holding an EXHIBITION of GAS COOKING HEATING, and GAS-CONSUMING APPLIANCES generally, on or about the 19th of May. Any Manufacturer of such Goods wishing to Exhibit, will please forward full particulars, and state space required.

The Company will supply Gas, &c., free.

For further information, &c., address
S. BARK, Secretary, &c.

FOR SALE—One 8-horse power Engine and COAL BREAKER, with top and bottom Elevator, Gear, and Patent Wrought-Iron Chain, with Malleable Iron Buckets complete.

The above Machinery is almost new, having only been in use about Three months.

For further particulars, apply to the COAL DISTILLATION COMPANY—COOPER'S PATENTS—LIMITED, 322 and 323, Winchester House, Old Broad Street, LONDON, E.C.

DENTON AND HAUGHTON LOCAL BOARD.

CANNEL AND COAL.

THE Gas Committee require Tenders, on or before May 10, 1890, for CANNEL and COAL.

Specification and form of tender may be obtained from Mr. J. M. Veevers, Gas-Works, Denton, near Manchester.

By order,
JOHN RICHARDS,
Clerk to the Board.

DENTON AND HAUGHTON LOCAL BOARD.

TAR.

THE Gas Committee require Offers, on or before May 10, 1890, for TAR.

Particulars may be obtained from Mr. J. M. Veevers, Gas-Works, Denton, near Manchester.

By order,
JOHN RICHARDS,
Clerk to the Board.

TENDER FOR GAS COAL.

THE Directors of the Cheltenham Gas- light and Coke Company are prepared to receive TENDERS for the supply of COAL during a period of Twelve months from the 1st of August next.

Particulars may be obtained from the undersigned, to whom tenders, endorsed "Tender for Coal," must be delivered on or before Tuesday, the 20th of May next.

R. O. PATERSON, Engineer.
Gas-Works, Cheltenham,
April 25, 1890.

TO PIPE FOUNDERS.

THE Directors of the North Bierley Gas Company are prepared to receive TENDERS for 1430 yards of 8-inch plane SOCKET PIPES in 9-feet lengths.

Particulars may be obtained on application to Mr. W. Oldfield, Manager.

Tenders to be sent in, addressed to the Chairman, on or before the 8th day of May, 1890.

By order,
EPHRAIM SUCKSMITH, Secretary.
Gas-Works, Oakenshaw, near Bradford,
April 26, 1890.

TENDERS FOR COAL.

THE Derby Gaslight and Coke Company are prepared to receive TENDERS for the supply of 40,000 tons of screened SOFT COALS and SOFT COBBLES or NUTS, to be divided into Four Contracts of 10,000 tons each, and to be delivered guaranteed weight 21 cwt. to the ton.

Sealed tenders, to be made on forms obtainable at the Company's Office (specifying the description of Coals and the Pits at which they are to be raised; stating the quantities and prices delivered at the Midland or Great Northern Railway Stations, or at the Gas Company's Siding, Midland Railway, London Road; if sent by Canal to be delivered at some Wharf in the Borough of Derby, or at the Gas Company's Wharf, London Road, in manner and subject to the conditions aforesaid), must be delivered at the Offices of the Company, Friar Gate, on or before Saturday, the 3rd day of May next.

By order of the Directors,
RICHARD FISHER, Secretary.
Derby Gas Office, April 15, 1890.

THE Directors of the Tenterden Gas Company are prepared to receive TENDERS for 260 tons of superior GAS COAL; the same to be delivered in the Company's Sheds as required.

Sealed tenders to be sent to the Secretary (Mr. Charles Cooper) on or before the 6th day of May next.

CHARLES COOPER, Secretary.

TAR.

THE Directors of the Chester United Gas Company are prepared to receive TENDERS for the purchase of the surplus TAR made at their Works for One, Two, or Three years, from the 1st of July next.

Tenders to be sent to the undersigned not later than May 13, from whom particulars may be had.

By order,

JAMES PYE, Secretary.

Cuppin Street, Chester, April 15, 1890.

BRISTOL UNITED GASLIGHT COMPANY.

TENDERS FOR GAS COAL AND CANNEL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of their requirements (say, 150,000 tons) of GAS COAL during a period of One year, commencing the 1st of July next.

Particulars and forms of tender may be obtained on application to the undersigned, to whom also tenders, sealed and endorsed "Tender for Coal," must be delivered not later than Ten a.m., on Monday, the 19th day of May next.

JAS. V. GREEN, Secretary.

Gaslight Offices, Canons' Marsh, Bristol, April 9, 1890.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Accrington Gas and Water Works Company invite TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR which may be produced at their Works, Accrington and Great Harwood, during One year, commencing on the 1st of July next, and terminating on the 30th of June, 1891.

The quantity of Tar it is estimated will be about 1300 tons; and Ammoniacal Liquor, about 2800 tons.

Additional particulars may be obtained on application to the undersigned.

Tenders, sealed, and endorsed "Tender for Tar and Liquor," and addressed to the Chairman, must be delivered not later than Wednesday morning, the 28th of May.

The Directors do not bind themselves to accept the highest or any tender.

By order,

CHAS. HARRISON, Secretary.

Offices of the Company, Hyndburn Road, Accrington, April 21, 1890.

YATTON GAS CONSUMERS' COMPANY, LIMITED.

TENDERS are invited for the supply and fixing at Yatton, in the county of Somerset, of—

One BENCH of Four 16-inch Round RETORTS, 9 feet long, with Flue and Sight Boxes, Furnace Door, and Ash-Pan complete (no other Ironwork).

Two PURIFIERS, 5 feet square, to be worked together or singly, with 5-inch Valves and Connections complete.*

One STATION METER, to pass 4000 cubic feet of Gas per hour, with 5-inch Valves and Connections complete.*

One 5-inch GOVERNOR, with Bye-Pass Valve and Connections complete.*

One GASHOLDER 35 ft. by 10 ft., with Columns, Girders, Valves, Inlet and Outlet Pipes complete.*

One IRON ROOF for Retort-House, with Louvres, to span House 25 ft. by 16 ft.*

Plans, specifications, and tenders to be sent to Mr. Samuel Dawes, Clevedon, on or before Thursday, the 8th day of May, 1890.

* Where second hand, state reduction in price as compared with new.

TO COLLIERY PROPRIETORS.

THE Directors of the Sligo Gas Company invite TENDERS for the supply of 2000 tons of good screened GAS COAL and 300 tons of CANNEL (of 20 cwt.) delivered free on board ship.

Payments, net cash One month after delivery.

The Directors do not bind themselves to accept the lowest or any tender.

Tenders, endorsed "Tender for Gas Coal," to be sent to the Chairman on or before May 14, 1890.

C. B. TULLY, Engineer and Secretary.

Gas-Works, Sligo.

COAL AND LIME CONTRACT.

THE Gas Commissioners of the Burgh of Dumfries will receive OFFERS for the supply of about 5000 tons of CANNEL and SHALE; also about 200 tons of SHELL LIME.

Delivery, as required by Manager, between the 15th of May, 1890, and the 15th of May, 1891. Carriage paid to Dumfries Station.

Endorsed tenders to be lodged with Mr. John Grierson, Town Clerk, on or before the 3rd of May next.

The Commissioners do not bind themselves to accept the lowest or any tender.

Town Hall, Dumfries, April 14, 1890.

TAR AND LIQUOR.

THE Gas Commissioners of the Burgh of Dumfries will receive OFFERS for the TAR and AMMONIACAL LIQUOR produced at their Works between the 15th of May, 1890, and the 15th of May, 1891.

Offers to state price per 100 gallons for Tar, and price per 100 gallons for Liquor, about 5° Twaddel.

The Contractor to remove or pay expenses of removal from the Works, from which there is Railway Communication.

Endorsed tenders to be lodged with Mr. John Grierson, Town Clerk, Dumfries, on or before the 3rd of May next.

The Commissioners will not bind themselves to accept the highest or any tender.

Town Hall, Dumfries, April 14, 1890.

ROCHDALE CORPORATION.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee of the above Corporation invite TENDERS for the supply of about 35,000 tons of GAS COAL, to be delivered during the ensuing Twelve months.

Offers may be for any portion of this quantity, and may be for either Screened Coal or Nuts.

The Committee reserve to themselves the right to accept any portion of the quantity offered in any tender.

Forms of tender may be obtained on application at the Gas-Works, and must be sent in to me not later than Noon on Wednesday, May 7, 1890, endorsed "Coal."

By order,

ZACH. MELLOR, Town Clerk.

Town Hall, Rochdale, April 25, 1890.

ROCHDALE CORPORATION.

TO BUILDERS AND CONTRACTORS.

THE Gas Committee of the above Corporation invite TENDERS for ALTERATIONS to the OFFICES and STABLES at the Gas-Works.

Plans and specifications may be seen (after Thursday next, the 1st of May), and any further particulars obtained, on application to Mr. T. Banbury Ball, the Manager at the Gas-Works.

Tenders, endorsed "Alterations," must be sent in to me not later than Noon on Wednesday, May 7, 1890.

By order,

ZACH. MELLOR, Town Clerk.

Town Hall, Rochdale, April 25, 1890.

TENDER FOR COAL.

THE Scarborough Gas Company invite TENDERS for the supply of about 16,000 tons, or upwards, of Best Screened SILKSTONE GAS COAL or COBBLES per annum for One or Two years, from the 1st day of July next.

Tenders, endorsed "Tender for Coal," must be delivered at the Company's Offices not later than Ten o'clock a.m. on Monday, the 12th day of May next.

The Directors do not bind themselves to accept the lowest or any tender.

By order,

WILLIAM J. MOON, Secretary and Manager.

Scarborough, April 23, 1890.

LANCASTER CORPORATION.

THE Gas Committee of the Lancaster Corporation invite TENDERS for the supply of about 1400 yards of 15-inch Cast-Iron GAS-MAINS, Turned and Bored Joints, to be cast in dry sand moulds, set vertically with socket end downwards, and spigot end cut off in the lathe; each Pipe to weigh 8 cwt. 1 qr., coated, tested, and in 9-feet lengths. Also the necessary SPECIALS.

Sealed tenders, endorsed "Tender for Mains," and stating price per ton on rails at Lancaster, to be sent on or before the 17th prox., to Thomas Swainson, Esq., Town Clerk, Lancaster.

The Committee will not accept any tender except for pipes cast vertically.

C. ARMITAGE, Manager.

Gas-Works, Lancaster, April 23, 1890.

CRAYS GAS COMPANY.

SUPPLY OF COAL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of about 4500 tons of GAS COAL, to be delivered between the 1st of July, 1890, and the 30th of June, 1891, in such quantities as shall from time to time be directed.

The Directors do not bind themselves to accept the lowest or any tender.

Tenders, stating price, to be addressed to the undersigned, and marked "Tender for Coal," so as to arrive not later than Tuesday, the 6th of May, 1890.

FRANCIS W. EDWARDS, Secretary.

Offices, the Gas-Works, St. Mary Cray, Kent.

FARNHAM GAS COMPANY, LIMITED.

THE Directors of the Farnham Gas Company, Limited, are prepared to receive TENDERS from Persons willing to supply and deliver, free of all Dues and Charges, at the Farnham Station, London and South-Western Railway, 1600 tons of one of the following descriptions of GAS COAL—viz., New Pelton, Pelaw Main, Aldwarke Main, or Strafford Silkstone—700 tons, to be delivered in quantities of 50 tons (at intervals of Seven days), before the 20th day of August next; 900 tons, to be delivered in quantities of 50 tons (at intervals of Seven days), between the 1st of October next and the 7th of February, 1891.

The Coals to be consigned to the order of the Farnham Gas Company, Limited, at the Farnham Railway Station.

In the case of Seaborne Coal, the Meter's Certificate of each quantity to be duly sent with Invoice of same.

Payment, monthly at the ordinary meeting of Directors.

Sealed tenders, marked "Tender for Coal," to be delivered to the Secretary, W. Wells, 112, West Street, Farnham, Surrey, not later than Eleven o'clock a.m., on Monday, the 5th of May, of whom forms of tender may be obtained.

The Directors reserve the right to reject the lowest or any tender.

Apr. 9, 1890.

C. & W. WALKER.

GASHOLDERS; PURIFIERS;
PURIFYING MACHINES;

CO_2 AND TAR-EXTRACTING WASHERS; SCRUBBERS;

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SLIDE VALVES; TAR BURNERS; &C. &C.

WOOD SIEVES.

ADDRESSES: 8, Finsbury Circus, London, E.C.; Midland Iron-Works, Donnington, near Newport, Shropshire.

"FORTRESS LONDON." "FORTRESS DONNINGTON,"—Telegraphic.

THE Directors of the Formby Gas Company invite TENDERS for—

1. Supply and erection of WROUGHT-IRON ROOF to cover Retort-House Extension.
2. Supply of CAST and WROUGHT IRONWORK required in the erection of Twelve Retorts complete.
3. Two PURIFIERS, Girder, Lifting Apparatus, and Centre-Valve complete.

Tenders must be sent in separately for each Contract by the 5th of May, sealed and endorsed outside, and addressed to the Chairman.

Plans and specification may be seen at the Office of the undersigned, or specifications obtained upon payment of 2s. 6d. separately.

J. W. BUCKLEY,
Engineer and Manager.

Gas-Works, Formby, April 24, 1890.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

NOTICE is hereby given that the Ordinary HALF-YEARLY GENERAL MEETING of the Shareholders of the above Company, will be held at the Offices of the Company, 30, Gracechurch Street, in the City of London, on Tuesday, the 20th day of May next, at Three o'clock in the afternoon precisely, to receive the Directors' Report and the Accounts of the Company for the Half Year ended the 31st day of December last, to declare a Dividend, to elect Directors and an Auditor in the place of those retiring by rotation, and to transact the General Business of the Company.

The Transfer Books will be closed from the 7th to the 20th prox., both inclusive.

By order of the Board,
ALFRED LASS, Secretary.

Offices: 30, Gracechurch Street,
London, April 22, 1890.

Price 2s. per dozen, or 10s 6d. per 100, post free.

CONSPIRACY and Protection of Property Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

*** *The Act extends to Scotland and Ireland.*

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

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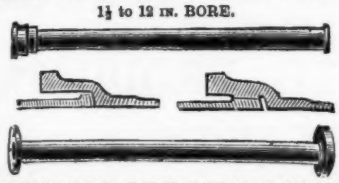

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Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

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Produce of Gas per ton - - - - - - - 10,500 feet.
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CANNEL COAL MERCHANT,

97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on application.

GAS COAL.

POPE & PEARSON, LTD.,

have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles; or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke.

This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SPENT LIMES NO LONGER WASTE PRODUCTS.

Under G. R. HISLOP'S PATENTS

All Spent Limes are most effectually, economically, and continuously recovered, and at from one-third to one-half the cost of New Lime. The results are a surprise to all who have inspected the process, and are entirely satisfactory to all now using it. Descriptive Pamphlet and Terms from Agents as under.

REGENERATIVE SETTINGS OF RETORTS.

Hislop's Patent Producer and Patent Charging Appliances offer advantages which are unapproachable, while in every other detail his Settings are confidently recommended as being the most inexpensive and effective possible.

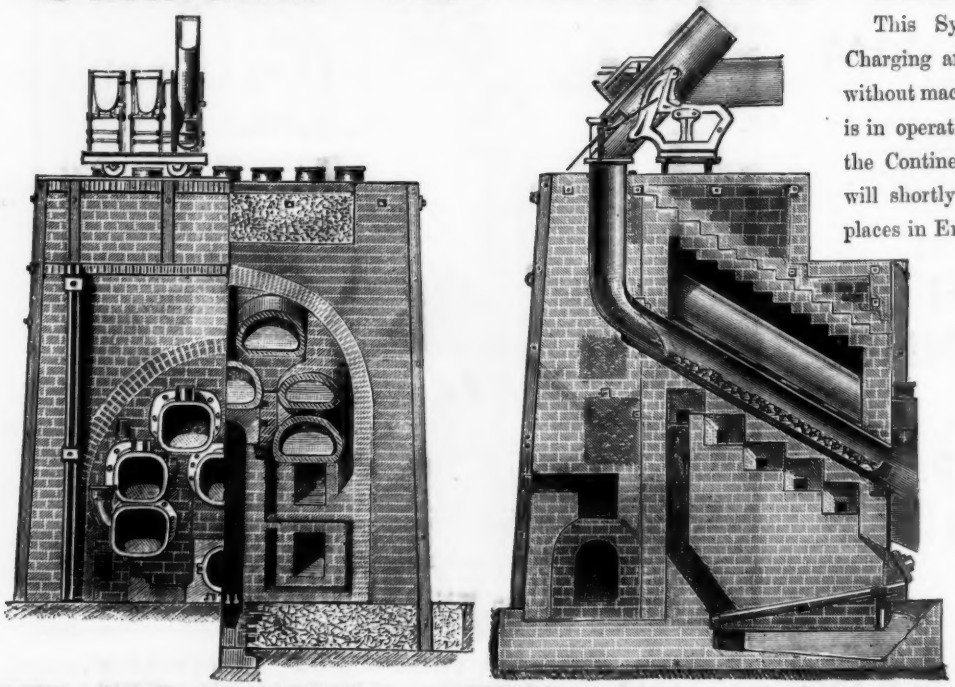
Illustrated Pamphlet and Terms on application to J. E. FISHER, Stourbridge, Agent for England and Wales; to C. M. HAMILTON, Portland Place, Hamilton, Agent for Scotland and Ireland; and for all other Countries to the Patentee,

Geo. R. HISLOP, Gas Engineer, PAISLEY, N.B.

COZE'S AUTOMATIC SYSTEM

OF

CHARGING AND DRAWING RETORTS.



This System of Automatically Charging and Discharging Retorts, without machinery or arduous labour, is in operation at several places on the Continent and in America, and will shortly be at work in various places in England.

All information as to advantages, cost, royalties, &c., can be obtained from the undersigned.

The System is fully patented, and any infringer will be strictly proceeded against.

GOLD MEDAL,
Paris Exhibition, 1889.

THE COZE SYNDICATE, LIMITED, 86-88A, LEADENHALL STREET, E.C.

WATER GAS FUEL GAS

FOR INDUSTRIAL PURPOSES

GENERATED FROM

BITUMINOUS SLACK COAL

BY THE

LOOMIS PROCESS.

The Cheapest Gas-Generating System in the World.

NOVEL IN DESIGN.
MODERN IN CONSTRUCTION.
SIMPLE IN OPERATION.
PERFECT IN RESULTS.

PROCESS AND APPARATUS PATENTED IN ALL COUNTRIES.

By this system more gas, and of a higher heating power per cubic foot, can be generated from a ton of Bituminous Slack Coal than by any other from a ton of Anthracite Coal or Coke.

The successful application of Water Gas for industrial purposes was brought about through this Process at the Works of the—

JOHN RUSSELL CUTLERY COMPANY, Turner's Falls, Mass., where it has been in daily use upwards of two years, doing all the Forging, Hardening, and Tempering.
HENRY DISSTON & SONS, Steel, Saw, and File Works, Philadelphia.
AMERICAN WALTHAM WATCH COMPANY, Waltham, Mass.
ADDYSTON PIPE AND STEEL COMPANY, Cincinnati.

Many other industrial establishments in America are successfully using this Process, and a large number of Works are now being erected, including a plant at Brussels and at Sheffield (at Messrs. Thomas Firth and Sons, Limited).

This process is especially adapted for firing all classes of Pottery, Tile, and Brick Kilns.

For particulars apply to

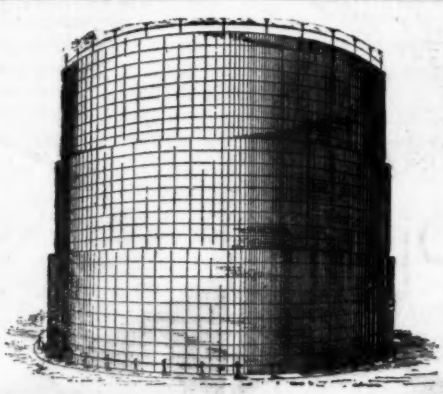
NEWTON, CHAMBERS, & CO., LIMITED,
THORNCLIFFE IRON-WORKS, near SHEFFIELD.

REVOLUTION
IN GASHOLDER CONSTRUCTION.

(GADD & MASON'S PATENTS.)

IMMENSE SAVING IN COST.
NO COLUMNS. NO FRAMING.
NO PIERS ROUND TANK.
GREATER STABILITY.
TILTING IMPOSSIBLE.

Tank Construction rendered simpler and very much cheaper; the Piers and heavy Base Stones being dispensed with.



In Holders for Export a very large additional saving is effected in Carriage, Freight, Transport, and Insurance; the Weight being reduced nearly 50 PER CENT.

Engineers intending to extend their Gas Storeage should not fail to see the Two-Lift Holder erected for the Northwich Gas Company.

ADMITTED BY EMINENT ENGINEERS TO BE THE SYSTEM OF THE FUTURE.

Telegrams: "SPIRAL MANCHESTER."

THE PATENT GASHOLDER SYNDICATE,
504, STOCKPORT ROAD, MANCHESTER.

RUSCOE'S PATENT MACHINE

FOR DRILLING AND TAPPING WATER-MAINS AND GAS-MAINS UNDER PRESSURE.

Patent Saddle Back and Drilling Apparatus, whereby Gas and Water Mains can have 2-in. 3-in., 4-in., 5-in., and 6-in. Branches put on without loss of Water or Gas.

Sole Maker of HELPS' PATENT PIPE EXTRACTOR.

Prices and Particulars on Application to

JOHN RUSCOE, Albion Works, Hyde, near Manchester.

SIXTY PER CENT. ECONOMY IN GAS LIGHTING

THE SCHÜLKE REGENERATIVE LAMP

FOR DOMESTIC AND EXTERNAL LIGHTING.

The only Generative Lamp employing the common flat-flame burners.

Lamps giving 20-Candle Power consume less than 4-feet of Gas per hour.

A PURE WHITE AND PERFECTLY STEADY LIGHT NOT AFFECTED BY DRAUGHTS.

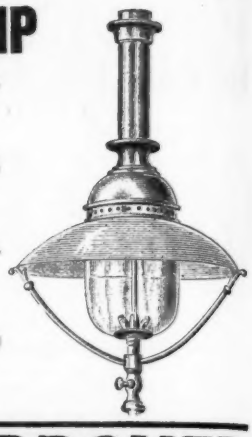
Suitable for any existing fittings (brackets or suspending). Can be fixed in a few minutes.

May be seen at the Offices of the

SCHÜLKE GAS-LAMP COMPANY, LTD.,

ROOM 446—11, QUEEN VICTORIA ST., LONDON, E.C.,

WHERE PRICE LISTS AND FULL PARTICULARS MAY BE OBTAINED.



RETORT SETTINGS IMPROVED

BY ADOPTING

THE "NUGENT" & "ROBUS" SETTINGS.

ECONOMY WITH DURABILITY GUARANTEED.

HUNDREDS OF SETTINGS WORKING EMINENTLY SATISFACTORY.

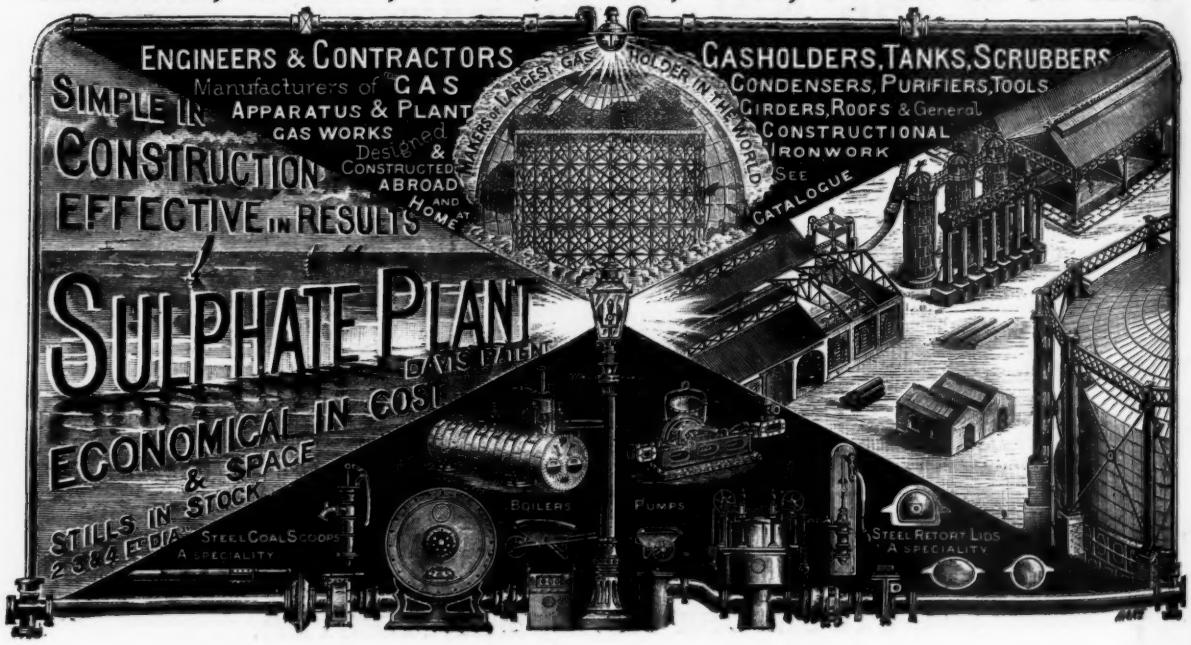
Estimates and Particulars for every Description of Retort Extensions and other Work.

J. & H. ROBUS,

CONTRACTORS FOR GAS AND WATER WORKS,

20, BUCKLERSBURY, LONDON, E.C.

ASHMORE, BENSON, PEASE, & CO., LTD., STOCKTON-ON-TEES.


ENGINEERS & CONTRACTORS
Manufacturers of GAS APPARATUS & PLANT
GAS WORKS Designed & Constructed ABROAD AND AT HOME
SIMPLE IN CONSTRUCTION EFFECTIVE IN RESULTS
SULPHATE PLANT
ECONOMICAL IN COST & SPACE
STILLS IN STOCK
STEEL COAL SCOOPS A SPECIALITY
MAKERS OF LARGEST GAS HOLDER IN THE WORLD
GASHOLDERS, TANKS, SCRUBBERS
CONDENSERS, PURIFIERS, TOOLS
GIRDERS, ROOFS & General CONSTRUCTIONAL IRONWORK
SEE CATALOGUE
BOILERS
PUMPS
STEEL RETORT LIDS A SPECIALITY

JAMES D. PERKINS. F. SEAVERNS.

PERKINS & Co.,

228 & 229, PRODUCE EXCHANGE, NEW YORK.

Cable Address: "PERKINS, NEW YORK." *Post Office Box 3695, New York.*

SOLE AGENTS FOR THE CELEBRATED

BRECKENRIDGE CANNEL

AND THE

OLD KENTUCKY BOGHEAD

OF KENTUCKY, U.S.A.

These Cannels will rank with the Australian Shale for Gas Manufacture.

Also General Sales Agents for

PENNSYLVANIA & VIRGINIA GAS COALS, & AMERICAN FOUNDRY & FURNACE COKE.

Delivery Prices made to any Port in

GREAT BRITAIN, ON THE CONTINENT, OR SOUTH AMERICA.

Full Information furnished upon Application to the above Address.

"LIGHT, Wenham Gas Lamps MORE LIGHT."

ITS ADVANTAGES ARE:

IMMENSE ECONOMY IN THE CONSUMPTION OF GAS.

INTENSITY, PURITY, AND STEADINESS OF THE LIGHT.

Absence of Downward Shadow. *Practical Completeness of Combustion.*

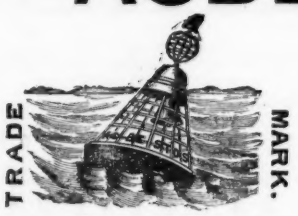
CAN BE FITTED TO ORDINARY SUPPLY-PIPES WITHOUT ALTERATION.

CAN BE USED AS VENTILATING LIGHTS, whereby the products are removed, and damage to decorations, &c., prevented.

SOLE PROPRIETORS AND MANUFACTURERS: THE WENHAM COMPANY, LIMITED.

Birmingham Branch: 121, CORPORATION STREET. Works: UPPER OGLE ST., LONDON, W. Manchester Branch: 5, DEANSGATE.

BELL'S ASBESTOS AQUOL PAINT



BELL'S ASBESTOS

IS MADE READY FOR USE.

IS FIRE RESISTING.
IS WASHABLE.
IS NON-POISONOUS.
IS MANUFACTURED IN ALL USEFUL COLOURS.
IS IMPERVIOUS TO HEAT, COLD, OR WATER.
IS WITHOUT SMELL.

No expensive Oil or Turpentine required.

WILL NEVER BLISTER.

HAS A COVERING CAPACITY **40** PER CENT. GREATER THAN LEAD PAINTS.

For Outside or Inside Work in any Climate.

Bell's Asbestos Aquol Paint is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

Bell's Asbestos Aquol Paint is susceptible of the most delicate treatment; and, owing to its perfect flatted surface, it brings up the varnish in a manner that no other paint can equal. ONE COAT OF VARNISH ON **Bell's Asbestos Aquol** IS EQUAL TO TWO COATS ON ORDINARY PAINT.

BELL'S ASBESTOS AQUOL PAINT is specially adapted for Private Houses, Exhibition Buildings, Ships, Churches, Asylums, School Boards, Railway Stations, and all work of Wood, Iron, Cement, Plaster, Stone, Brick, &c., &c.

Those who Study Economy and Protection from Fire should use only

BELL'S ASBESTOS AQUOL PAINT.

BELL'S ASBESTOS AQUOL PRIMING is made Ready for Use.
BELL'S ASBESTOS AQUOL PRIMING stops all suction of Wood, Cement, Plaster, &c.
BELL'S ASBESTOS AQUOL PRIMING should be applied to all New Work.

Suitable for Ceilings, Walls, and New Wood, and is very durable.

BELL'S ASBESTOS AQUOL KNOTTING, for Stopping Knots in New Work.

AN EXCELLENT CURE FOR DAMP WALLS.

Colour Cards and Price Lists on Application.

Supplied in Casks of 5 to 7 cwt., and Iron Drums of 28, 56, and 112 lbs., Sample Tins of 7 and 14 lbs.

Owing to its Covering Capacity, a SAVING IN FREIGHT of 40 per cent. is effected for a given surface.

BELL'S ASBESTOS COMPANY, LIMITED,

SOUTHWARK, LONDON, S.E.

DEPOTS—MANCHESTER: Cable Street, Blackfriars. LIVERPOOL: 2, Strand Street, James Street. HULL: Humber Dock Basin. GLASGOW: 35, Robertson Street. DUBLIN: 2, St. Andrew Street. AMSTERDAM: 264, N. Z. Voorburgwal. BERLIN, BARCELONA, and ANTWERP.
AGENTS—BIRMINGHAM: BELL and Co., 7, John Bright Street. CARDIFF: BELL and Co., West Bute Street.

BELL'S ASBESTOS

EXPANSION SHEETING.

The above, which can only be obtained from this house, is recognized as the **most efficient and economical jointing material in use.** It is composed of a specially-prepared India-rubber Compound, protected by a covering of Vulcanized Asbestos Sheeting, as shown above; and as it is the only Jointing Material which adequately **combines permanent elasticity with heat resistance,** the advantage it possesses will at once be seen.

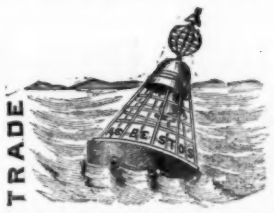
EXPANSION RINGS.

The centre from which the requisite elasticity is obtained will adapt itself to uneven surfaces to which it may be applied, and allow the expansion and contraction to be fully taken up. The covering being of Asbestos Cloth imparts a protection to the centre, and so prolongs its elasticity. **For Manhole, Mudhole, Steam Pipe, and Mash Tun Door Joints, it is unequalled;** and if applied as directed, **a ring can be used many times over.**

Made from 1-Ply for Cylinder and Faced Joints to any thickness for Uneven Surfaces.

BELL'S ASBESTOS CO., Ld.

DEPÔTS.
MANCHESTER: Cable St., Blackfriars.
LIVERPOOL: 2, Strand St., James St.
HULL: Humber Dock Basin.
GLASGOW: 35, Robertson Street.
DUBLIN, BERLIN.



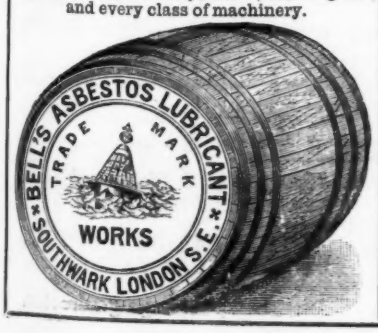
DEPÔTS.
AMSTERDAM: 264 N. Z. Voorburgwal, BARCELONA, and ANTWERP.
AGENTS.
BIRMINGHAM: BELL and Co., 7, John Bright Street.
CARDIFF: BELL and Co., West Bute St.

Southwark, London, S.E.

BELL'S ASBESTOS
YARN AND SOAPSTONE PACKING
Is the BEST LOCOMOTIVE PACKING made.

BELL'S
COMPOUND HYDRAULIC PACKING
Is specially suited for Hydraulic Machinery, Accumulators, and Ammonia and all Pumps.

BELL'S ASBESTOS LUBRICANT
Is unequalled
For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.



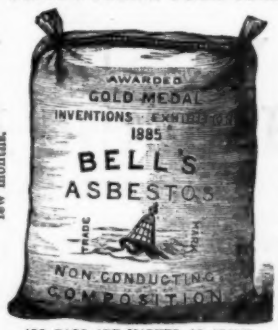
BELL'S ASBESTOLINE
The reputation of this Lubricant is based on the experience of thousands of users, which places it far in advance of those who rely only on mere laboratory tests.

ASBESTOLINE IS THE CHEAPEST MOST EFFICIENT, CLEANEST MOST INODOROUS AND SAFEST LUBRICANT.

ASBESTOLINE HAS SAVED 90 PER CENT. OVER OIL.
Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

BELL'S ASBESTOS
"DAGGER" PACKING
Is unequalled for every kind of Marine and Land Engine, Steam-Pumps, &c., and has proved itself to be the most efficient durable, and economical Packing made.

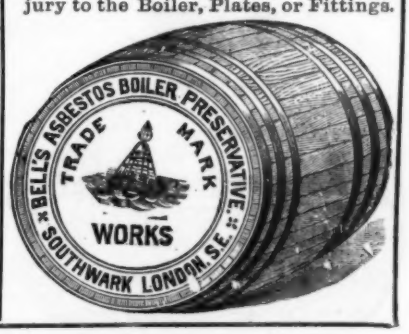
BELL'S ASBESTOS
NON-CONDUCTING COMPOSITION.
Will reduce loss by radiation, and saves 40 per cent. of fuel.
Is superior to any other, and saves its cost in a few months.



Can be applied again after many years' service.
Is sent out dry in bags; therefore cheaper than others sent out wet.

ALL BAGS ARE MARKED AS ABOVE.

BELL'S ASBESTOS
BOILER PRESERVATIVE
Will effectually keep Boilers clean, and remove any Incrustation, without injury to the Boiler, Plates, or Fittings.



W. C. HOLMES & CO.,

CONTRACTING GAS ENGINEERS.

SPECIALITIES.

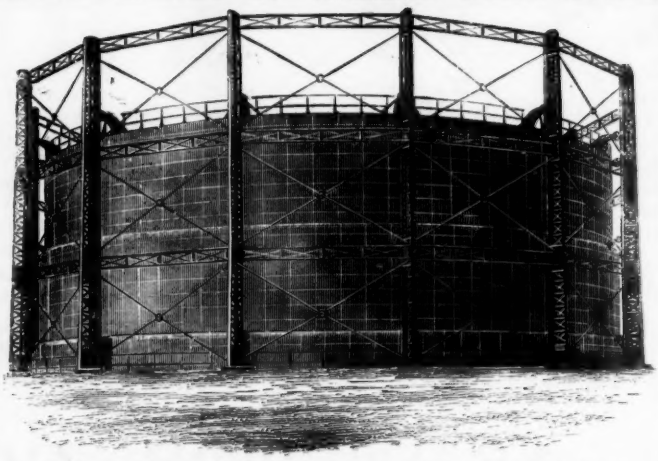
Patent Regenerative Retort-Settings.

Patent Rotary Scrubber-Washer.

Patent Reciprocating Exhauster.

Patent Regulator.

Patent Anti-Dip Pipes.



Treble-Lift Gasholder, 130 ft. by 66 ft., as erected at Burton-on-Trent, 1889.

SOLE MAKERS OF

DRAKE'S PATENT

GAS PLANT

Specially adapted for Country Places, and for mixing with Coal Gas to increase Illuminating Power.

Condensers, Scrubbers, Purifiers, and all Fittings for Gas-Works.

IMPROVED CHEMICAL PLANT.

Telegrams: "Holmes Huddersfield." "Ignitor London."

WHITESTONE IRON-WORKS, HUDDERSFIELD,

AND

80, CANNON STREET, LONDON, E.C.

Illustrated Catalogues on application.

WEST'S GAS IMPROVEMENT Co., Ltd.,

Engineers, Ironfounders, & Contractors,

ALBION IRON-WORKS, MILES PLATTING, MANCHESTER,

MANUFACTURERS OF

WEST'S PATENTED MACHINERY FOR CHARGING AND DRAWING GAS-RETORTS.

OVER **160** MACHINES AT WORK AND IN COURSE OF CONSTRUCTION.

Advantages attending its use are:—

INCREASED VOLUME of GAS per TON, and INCREASED YIELD per Retort.—The system of breaking and distributing the coals in an even layer in the retorts effecting more perfect carbonization.

REDUCTION in LABOUR and COST of WORKING.—In Works where this System of charging and drawing Retorts is adopted, there has been effected a substantial saving in the cost of Gas Manufacture in the Retort-House; the amount saved varying in different Gas-Works from **8 PENCE** to **15 PENCE per Ton** of coal carbonized. Full particulars will be forwarded upon application to W. G. I. Company, Limited.

MANUAL CHARGING AND DRAWING MACHINES.

POWER CHARGING AND DRAWING MACHINES, driven by WIRE ROPE, STEAM, or COMPRESSED AIR.—The power machines are applicable to circular, oval, or ∩-shaped retorts and mouthpieces, and are the most perfect, economical, efficient, and durable machines made. They are constructed on principles founded by long and extensive experience in this special branch of gas engineering and the manufacture of gas.

Sole Makers of **Circular, Oval,** or ∩-shaped **Mouthpieces,** with Morton's Self-Sealing Lids fitted with

KING'S PATENT FASTENINGS,

which, by a simple wedging action at each end of the crossbar, secure a very tight joint; and at the same time, by their long sliding motion, they effectually remove the tar or other matter from the surfaces of the mouthpiece and lid.

N.B.—The whole of these Fittings are made of Wrought Iron.

Estimates and further particulars forwarded upon application for Mouthpieces complete, or for Lids and Fastenings separately.

Makers of THOMAS & SOMERVILLE'S COKE-BREAKING MACHINE.
Sole Makers of WHITE'S PATENT AUTOMATIC GAS-VALVE.

Mr. JOHN WEST, M. Inst. C.E., Managing Director.

ILLUSTRATED CATALOGUE SENT UPON APPLICATION.

WILLIAM INGHAM & SONS,

WORTLEY FIRE-CLAY WORKS,
Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing Adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

MACHINE-MADE GAS-RETORTS.

F. & C. OSLER,

(Established 1807)

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS.

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES,

TABLE GLASS OF ALL KINDS,

CHANDELIERS IN BRONZE AND ORMOLU.

MODERATOR LAMPS.

100, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

OXYGEN, OXYGEN, OXYGEN.

(Extracted from the Atmosphere by **Brin's Patent Process.**)

40,000 cubic feet always in Stock.

Managers of Gas-Works supplied with Oxygen compressed in Weldless Steel Cylinders, for experimental purposes, &c., at special rates.

Estimates given for the erection of Oxygen Producers in Gas-Works, &c.

Managers of Gas-Works specially invited to inspect our Works.

The Manchester Oxygen (BRIN'S PATENT) Co., Ltd.,

GREAT MARLBOROUGH ST., OXFORD ROAD,

MANCHESTER.

Manufacturers and Compressors of all kinds of Gas.

"THE METEOR."

NEW HIGH-POWER GAS-LAMP,

Westphal's Patent.

Gas Companies should hire these Lamps to their Consumers, and introduce them for Street Lighting as a rival to the Electric Light, as they do not get out of order, are most economical, and the Burner being a circular slit does not choke up.

Particulars and Prices Free.

HENRY GREENE & SONS,

SOLE CONSIGNEES FOR GREAT BRITAIN & COLONIES,
153 TO 155, CANNON STREET,
LONDON BRIDGE, E.C.

J. & W. HORTON

ETNA WORKS,

SMETHWICK,

NEAR BIRMINGHAM

(Established 50 Years),

PATENTEES

AND

MANUFACTURERS

OF

IMPROVED GASHOLDERS AND BOILERS

and Manufacturers of every description of

Gas Apparatus

Cast and Wrought Iron Tanks, Purifiers, Condensers, Scrubbers, Retort Lids, Cross-Bars and Screws, Wrought-Iron Boilers for Stationary, Portable, and Marine Engines, Sugar Pans, Coolers, Clarifiers, Punts, Boats, Bridges, Girders, Roofs, Cisterns, Oil-Tanks, Melting-Pots, Crucibles, Salt-Pans, Arch and Range Boilers, and every description of General Ironwork.

Drawings, Specifications, and Estimates supplied

GAS COAL.

BEST

REAL OLD SILKSTONE GAS COAL.

Address, THE STRAFFORD COLLIERIES COMPANY,

Near BARNSLEY, SOUTH YORKSHIRE.

FOR PAINTING GASHOLDERS, PIPES, IRON BUILDINGS, SHEDS, BRIDGES, COLUMNS, &c., &c.

THE BEST POSSIBLE PRESERVATIVE FOR IRONWORK.

RED OXIDE OF IRON,

INQUIRIES SOLICITED.

Large Consumers supplied ON MORE FAVOURABLE TERMS than can be obtained from any other Manufacturer.

ADOLPHE CROSBIE, Walsall Street Chemical Works, WOLVERHAMPTON.

— SPECIAL NOTICE. —

G. J. PARKINSON & Co.,

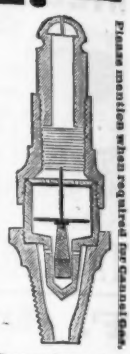
PENN STREET, CURZON STREET, BIRMINGHAM,

Have, from the 1st of January, 1890, commenced the supply of their

IMPROVED PATENT GAS GOVERNOR BURNER,

which cannot be surpassed by any other Burner in the market at the present time.

DO NOT MEET.



Please mention when required for Cannel Gas.

PRICE 14s. PER DOZEN. *Trade Terms and further particulars on application.*

They will be pleased to supply a sample of their IMPROVED PATENT STREET LAMP GOVERNOR, *free of charge*, to Gas Companies, Corporations, and Municipal Authorities on application.

JOHN BROWN & CO., LIMITED,

ATLAS STEEL AND IRON WORKS, SHEFFIELD,

ALDWARKE MAIN GAS COAL.

This Coal yields 12,600 feet of 16-candle gas per ton.

Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.

FIRE BRICKS,

LUMPS, TILES,

BLOCKS, &c.

Special Bricks for Intense Heats.

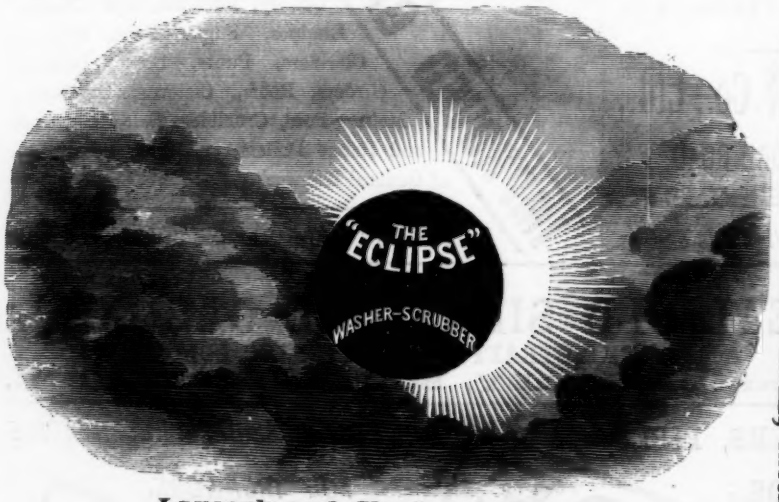
GAS RETORTS.

CASTINGS AND EVERY REQUISITE FOR GAS-WORKS.

MOBBERLEY & PERRY,

Fire-Brick Works, STOURBRIDGE.

☛ Retort Setters sent to any part of the Kingdom.



Laycock and Clapham's Patent.

The most efficient Machine known for extracting Ammonia and other Impurities from Coal Gas.

MACHINES with a total capacity of **42,500,000** cubic feet now working, and give great satisfaction.

LAST YEAR 11 Machines erected with a total capacity of **20,000,000** *feet.*

Send for Descriptive Catalogue to the Sole Makers :

Clapham Bros., Wellington, Nelson, & Market St. Works,

KEIGHLEY, YORKS.

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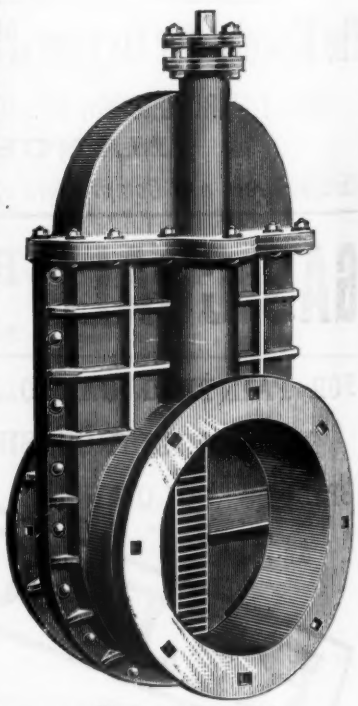
Mr. M. Schwab, 96, Deansgate, Manchester.
Mr. E. H. Wardwell, 10, Warren Street, New York, U.S.

SILVER MEDAL, Inventions Exhibition, 1885.



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